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EDITED BY

DR. E. M. WALKER,

Biological Department,
UNIVERSITY OF TORONTO, TORONTO

Editor Emeritus: REV. C. J. S. BETHUNE,
ONTARIO AGRICULTURAL COLLEGE, GUELPH, ONT.

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LIST OF CONTRIBUTORS TO VOL. XLVIII.

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ALEXANDER, DR. CHAS. P., Cornell University	ITHACA, N. Y.
ALLARD, H. A., U. S. Dept. Agriculture	WASHINGTON, D. C.
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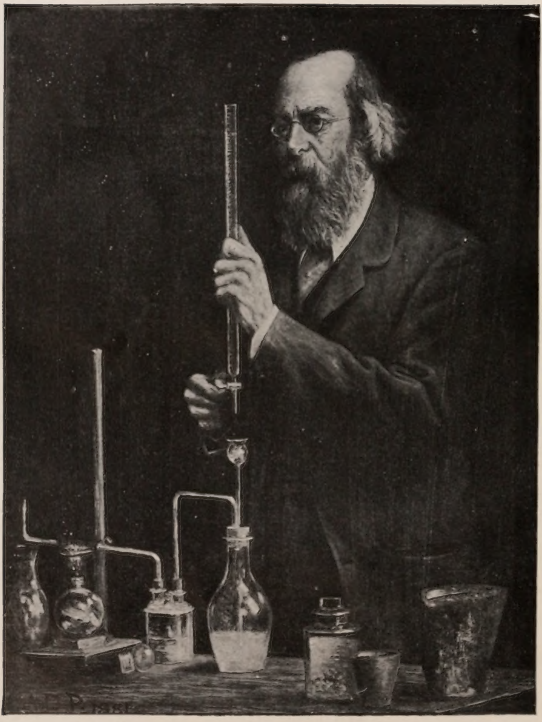

HENRY HOLMES CROFT, D. C. L., F. C. S.
President of the Entomological Society of Ontario, 1863–4; 1868–71.

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PROFESSOR H. H. CROFT, D.C.L.

A most interesting memoir of the first President of the Entomological Society of Ontario, by Mr. John King, K.C., has recently been published by the Macmillan Company of Toronto.* Through the kindness of the publishers we are enabled to present to our readers an excellent portrait of one of the pioneers in Canadian Entomology, who was largely instrumental in founding the Society.

Henry Holmes Croft was born in London, England, in 1820; his first schoolmasters were French and Spanish refugees from the great Napoleonic wars, who strove to make a precarious living by teaching boys in their city of refuge. From them he passed on to Tavistock House, where he received an excellent training and the foundation of a sound education. During this period, while still a mere lad, he manifested a great taste for chemistry and carried on experiments in a small closet under the kitchen stairway in his father's house, much to the annoyance and disgust of the members of the family, who showed no appreciation of a science which seemed to produce only alarming explosions and abominable smells.

After leaving school he spent a year in the office of his father, who was Deputy Paymaster-General in the Ordnance Department, then situated in the Tower of London. With him and an elder brother he walked to the Tower and back, eight miles each way, morning and evening throughout the week, and by this means acquired vigorous health and a robust constitution which continued through life. Office work was by no means congenial, and the heart of the youth was in his little den under the stairs. By the advice of Professor Faraday, whom his father consulted, he was sent to study chemistry at the University of Berlin. He did not, however, confine his attention to this subject, but took courses of study in biology, physics, anatomy and physiology, geology and kindred sciences, and became greatly interested in entomology.

* McCaul; Croft: Forneri; Personalities of Early University Days. By John King, M.A., K.C. The Macmillan Company, St. Martin's House, Bond Street, Toronto. (Price $1.25).

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After three and a half years of steady work, he left the University with every distinction that a student could desire and returned to England in the autumn of 1841.

In the spring of the following year the University of King's College, Toronto, was being organized, the selection of a staff being placed in the hands of the Governor-General, Sir Charles Bagot. A number of eminent scientific men in England, including Professor Faraday, were consulted, and they one and all recommended in the highest terms young Croft for the chair of Chemistry and Experimental Philosophy. He was then but two and twenty years of age.

In January, 1843, Professor Croft arrived in Toronto and at once entered upon his new duties, which he discharged for thirty-six years with the utmost devotion and unqualified success.

It would be out of place to refer to the bitter controversies over University matters that raged for many years in Toronto, and in which Professor Croft took an active and influential part. The abolition of King's College and the establishment of the University of Toronto and University College are matters of Canadian history. In the former Professor Croft became Vice-Chancellor in 1849 and *ex-officio* a member of the University Senate; he was also a member of the College Council, and in both these governing bodies he was zealously interested and exercised important influence.

"In the lecture room"—to quote from the volume referred to above—"he was an admirable expositor and a happy and dexterous demonstrator. Like all good teachers of a rapidly-advancing science, he made his pupils eager for more than he gave them. In a far wider sphere than his lecture-room he, more than any other teacher in Canada, simplified and legitimately popularized chemistry, and he may be said to have laid the foundation of our educational system of practical chemistry and the admirable methods of illustration in chemical research and analysis."

He did not, however, confine his energies to the laboratory and lecture-room, but took an active interest in many organizations of public importance. He was a leading member of the local agricultural and horticultural societies, and repeatedly drew attention to the intimate relation which chemistry bears to the practical work of both departments.

In Entomology he was especially interested and formed a collection of Coleoptera of the Province, and it was through his interest in this branch of natural history that attracted the writer to him and that led to a warm friendship. My first acquaintance with him was made in 1858 at meetings of the Canadian Institute which I attended as a junior member when a student at Trinity College. Professor Croft treated me with the utmost kindness and helped and encouraged me greatly in the study of Entomology. Through him also I came to know the late Dr. William Saunders, Director of the Experimental Farms of the Dominion, who was a life-long and deeply esteemed friend.

In 1862 our devotion to the collection and study of insects arose to such a height that we thought the time had come for drawing together all those in Canada who were of similar tastes and forming a society for mutual help and encouragement. Professor Croft warmly approved of the scheme and, through his influence and that of his colleague, Professor Hincks of the Botanical Department, the Society was duly launched in the spring of 1863.

The following account is given by Mr. King in his memoir:— "Professor Croft was very honourably identified with a Society which was brought into existence chiefly through his instrumentality, and whose laudable objects are closely associated with the progress of skilled husbandry everywhere, namely, the Entomological Society of Ontario. He was the founder, or at least one of the founders, of this Society; the first meeting of its originators was held at his residence, and its present standing and widely acknowledged usefulness are largely due to his fostering care, warm advocacy, and powerful support. In disseminating information in regard to the insect pests of the agriculturist and horticulturist, as well as to insects friendly to their products, the Society has performed a work of vital service. Its admirable collections at the Centennial Exhibition at Philadelphia in 1876, comprising 86 cases filled with thousands of specimens carefully classified and named, attracted universal attention, and were far in advance of any other exhibit of the kind in the whole Exhibition. The economic worth of such collections can be estimated only by those who have given some attention to the subject; they form a groundwork upon which may be built up observations of great value, and

must have the effect of stimulating intelligent research in this important department of natural science."

"Within comparatively recent years the bounty of the Government has greatly assisted the operations of this Society. Its periodical publications, ranging over many years, contain a vast amount of original matter, recording valuable observations of a most instructive character on insects in all parts of Canada. These publications have been much sought after, both in Europe and America; some of the early numbers have been reprinted in order to meet the demand, and complete sets of the Society's works are now found in many prominent scientific libraries on both continents"

This quotation from the work of a barrister, who is not particularly interested in natural science, is highly appreciated testimony to the usefulness and value of the Society which Professor Croft was largely instrumental in founding.

Another Society which owed much in its origin and early years to the fostering care and enthusiastic support of Professor Croft, one of its founders, is the Canadian Institute of Toronto, now by warrant of His Majesty King George entitled to the prefix of *Royal*. Twice Professor Croft was elected President and for a long series of years he was a member of its Council and regular attendant at its meetings. Its periodical, "The Canadian Journal," received many contributions on chemical subjects from his pen. He was not, however, a voluminous writer, and it is much to be regretted that his stores of experience and research were not rendered available to students in a permanent form. His work on Analytical Chemistry for the use of students in Arts and Medicine was long employed as a text-book, and was an evidence of what he might have done in the field of scientific authorship, had he been so inclined.

In these days of terrible war it is interesting to know that Professor Croft took an active part in the formation of the Canadian Volunteer force, which was brought into being during the winter of 1861-62, when there seemed to be imminent danger of an armed conflict between this country and the United States in consequence of the "Trent affair." Professor Croft called a meeting of students and ex-students at the University and excited

the large gathering by a rousing speech to form an active rifle corps. He was at once elected Captain and the ranks were speedily filled. "The University Rifle Corps" was firmly established and soon attained a high degree of efficiency. Subsequently it formed a part of the famous Queen's Own Rifles of Toronto and bore a share in the engagement with the Fenians at Ridgeway in June, 1866, when three of its undergraduate members were killed and several wounded.

Years went by, each one filled with steady work and each adding to the esteem in which the Professor was held by many successive generations of students and by the public at large. At length, his health began to fail and the strong, vigorous man found that he could no longer sustain the burden of his University work, and that the time had come for his retirement. In 1879 he resigned the Professorship that he had so long and so ably filled, and removed with his family to Las Hermanitas, near San Diego, in Texas. There he spent a few pleasant years of rest and quiet and died on March 1st, 1883. Seven years later a Protestant Episcopal Church was erected in San Diego by his children and dedicated to his memory and that of their mother. At the University of Toronto his name is commemorated by the portrait in the Senate Chamber (from which our photograph is taken) and the beautiful round building now known as "The Croft Chapter House," which for many years was his laboratory and the centre of his work. In the words of his biographer, "It was there that his hundreds of students were initiated into the mysteries of his favourite science, and learned those lessons of patient enquiry and minute observation which are invaluable in the lifework of every man. Those who in times past were his pupils and found delight in his scientific investigations will not soon forget his enthusiastic zeal, his enlarged acquaintance with the literature of his department, his kindly interest in all amongst his friends and followers who manifested a regard for his favourite studies."

"He retired from his field of work with a consciousness of duty well done, and with the gratitude which is certain to follow one who, after a long term of public service, has finished a work which has been carried on with conscientious fidelity and far-reaching success."

C. J. S. Bethune.

POPULAR AND PRACTICAL ENTOMOLOGY.

Heliotropism in Butterflies; or, Turning Towards the Sun.

BY ALBERT F. WINN, WESTMOUNT, QUE.

Those who have read Dr. G. B. Longstaff's book, "Butterfly Hunting in Many Lands," have enjoyed his accounts of the peculiar habit that some species of butterflies have of carefully adjusting themselves to a certain position when they settle. Most of us will recall similar instances, such as our common Sulphur, *Colias philodice*, which is often seen in great numbers near puddles of rain water along country roads, resting with the wings closed over the back frequently leaning over at an angle of 45° to even 30° to the ground; or the Vanessas and Graptas alighting on a fence or tree trunk only to immediately shift the position of the body to one perhaps at right angles to what it had been or even exactly reversing the direction in which the head pointed. But until attention was called to it as a phenomenon of which an explanation was desired, it has been generally passed by as being an everyday occurrence, without any effort being made to try to find out *why* the insect should act so, or to keep accurate notes on exactly what the respective positions were, as well as the position of the sun, direction of the wind, temperature and nature of the object settled on.

A theory of Dr. Longstaff is, that in assuming a position inclined sideways the butterflies more easily escape detection, as the shadow is reduced to a minimum. This may be the true explanation in the case of the insects which Dr. Longstaff has seen and studied in his extensive travels, and we do not wish to imply or express the slightest doubt on his interesting conclusions, but only to call attention to a subject that has been little written about in the life-histories and habits of our Canadian butterflies, and careful observations may prove valuable as well as being interesting to the student of nature.

So far as *Colias philodice* is concerned, this *orientation*, as it is termed, was referred to in an article in one of the early volumes of this journal by Wm. Couper—"A Dissertation on Northern Butterflies" (Vol. VI, p. 92). He says: "When it alights on a flower, instead of being erect on its feet, it lies sideways, as if to receive the warmth of the sun." The same idea has been maintained by

Major Tulloch, F.E.S., in regard to *Catopsilia pomona* in Hong Kong (Ent. XLVI, 205), but it would seem that neither the shortening of the shadow nor the obtaining of warmth will explain all there is to be learned. Unless my memory serves me badly, I can recall patches of roadside where *Colias philodice* had congregated in dozens, many of them resting with their wings at a decided angle, and they were not at all agreed as to the direction of the body; some had the body at right angles to the sun's rays, others with the tail towards the sun, others again intermediate. So the shadows would be all sorts of sizes and shapes, besides which it seems to require explanation how a number of shadows on a dusty or muddy road would add to the conspicuousness of these sulphur butterflies, so bright and attractive are they when they collect in little flocks, some members of which are constantly fluttering about. Of course, we can only judge this from their appearance to the human eye; what natural enemies they fear is another matter. My own observations being confined to a robber fly (*Asilidæ*) catching one on the wing, and another being gobbled up by a big toad, this latter victim was leaning over, and many others within a few inches were erect. The idea of warmth being sought seems to fail in that some of the hottest days appear to be favourable for leaning over, and one flock will be found for the most part leaning over, while in another perhaps only a few feet away they will all be erect, while on cool days, though bright, none may be at an angle. It seems that a combination of circumstances is often involved, and that perhaps the brightness of the midsummer sun full face is too great and makes many of them prefer to turn their profile towards it. The direction of the wind, if strong, may also affect them to some extent, so also may the direction of the road, for many of the roads loved by the sulphur butterflies are full of ruts and ridges made by cart and carriage wheels, and a butterfly settling on such a ridge longitudinally must either stretch out the three legs on one side more than the other three or he would inevitably lean over. When resting on flowers, say thistle, their heads certainly point in all sorts of directions; but those that are feeding should be noted separately from those that are not, for an insect will do all sorts of gymnastics to get its dinner, and the same remark should apply to flocks about damp patches on the

roads, and very careful attention is necessary to see whether the tongues are in active use.

Now, let us look at the Graptas and Vanessas. Dr. Longstaff quotes the following from Parker (Mark Anniv. Vol., p. 453-469). "*Vanessa antiopa* and the Graptas settle with their wings full expanded and adjust their position so that the axis of the body is parallel to the sun's rays with head turned away from the sun."

One spring afternoon I was in a grove near Montreal and noticed many insects about a large maple tree, whose sap was flowing freely from wounds made by real estate subdivision "artists." On the western side in the sunlight were several *Vanessa antiopa* and one *Grapta progne* all settled with wings wide open, while on the shady side were a larger number of *V. antiopa* and three or four *Grapta j-album* all with their wings closed over their backs.

On another occasion, this time in August, sugared patches on my fences were attractive to butterflies. A post on the east side was in the full glare of the sun at 2 o'clock, and an *antiopa* and a *Pyrameis atalanta* kept settling on the sweetened place—curiously the *antiopa* always approached the patch from above and settled head downwards, while *atalanta* flew upwards and settled head up, and both kept the wings expanded. On the opposite side of the garden, which, of course, was in the shade, another *antiopa* settled head up and kept the wings tightly closed.

While on my holidays a couple of years ago at North Hero, Vermont, a capital chance was afforded to watch a male *Grapta comma*. It was a particularly hot, cloudless day, and the only comfortable place was in the lake, and the whole morning was spent at the beach. When we beached our boat, the butterfly was there to meet us, just fluttering a little way aside to let us pass across the beach to disrobe. After a lengthy dip, I had to wait a considerable time before my son could be persuaded that he had enough, and, for want of something better to do, I lay down in the shade of the boat and watched the butterfly, which continued to fly about, always within a radius of perhaps 10 yards, and this is what he did:—

1st—Settled on the sand, head towards the north, closed wings over back, and inclined at an angle of about 60° with the ground, the tips of wings towards the west.

2nd—Settled on sand, head towards south, held wings out flat, shifted slightly so head pointed towards southwest.

3rd—Settled head towards west, wings closed and perpendicular.

4th—Same position as No. 1, but did not orient.

5th—Settled on sand, head towards west, then shifted towards northwest, raising up body as if pitching forward, the wings closed and vertical.

6th—Settled on a log, head towards north, wings closed and vertical, remaining in full sunshine for at least 10 minutes, and was only disturbed when touched with an oar.

7th—Returned to exactly same spot on log, head northward, wings outstretched.

8th—On sand, head towards west, wings closed and slightly leaning over towards south.

9th—On the body of a small dead rock bass, head north, wings closed, then opened out flat and turned around facing south and walked to the head of fish and apparently inserted its tongue into the eye-socket of the bass.

10th—On the bow of boat, in the shade, wings closed, pointing northwest, head downward; had to be stirred up.

11th—Settled on sand, wings outstretched, head towards west.

The arrival of a large motor-boat with a cargo of very hilarious week-enders put an end to a peaceful aspect of nature, and we left *G. comma* on the shore and rowed home for our dinner.

The results of watching the habits of one single butterfly in one hour of its existence shows next to nothing as might be expected. It requires a lengthy study of the combined efforts of students of nature in many localities and different seasons and conditions to arrive at an adequate understanding of the reasons a creature has for its actions. One point worthy of mention is that in no case did it remain directly facing the sun, and incidentally also the wind which was (as is customary on Lake Champlain) south, except when on the dead bass. It may also be worth mentioning that the beach was strewed with dead fish, bass, perch and pickerel, and the sand, though dry and warm on top, was doubtless permeated with decomposed fish, and the butterfly, on settling in the sand, may have inserted the tongue down to where there was moisture of a flavour suited to its taste.

NOTES ON SMICRONYX WITH DESCRIPTIONS OF A NEW SPECIES AND A NEW VARIETY.

BY W. S. BLATCHLEY, INDIANAPOLIS, INDIANA.

Among some specimens of Smicronyx sent me about a year ago by Col. Thos. L. Casey, of Washington, D. C., was one bearing the label, "*S. vestitus* Lec. from Indiana." This species was described by LeConte* from a single Kansas specimen. A comparison of Col. Casey's specimen with the type in the LeConte collection at Cambridge shows the latter to be much larger and more robust, with head, beak and thorax wholly black, elytra dull reddish; scales large, close-set and evenly distributed; thorax wider than long; elytra with distinct, coarse inclined setæ. LeConte gives its form, colour and vestiture as: "Rather robust, convex, black very densely clothed with grayish and yellowish broadly oval scales; antennæ and legs ferruginous brown." He states that the intervals are flat, each with a row of whitish hairs, and gives the length as 2.75 mm., all of which characters agree with his Kansas type. Both Col. Casey and Dr. Dietz have misinterpreted LeConte's species, as neither one had the type before him when describing the species they call *vestitus* in their papers on the genus,† and Dietz, loc. cit., p. 160, criticizes Dr. LeConte's description as "defective and misleading, as the terms 'robust' and 'prothorax densely and coarsely punctured' do not apply here, nor is any reference made to the reddish colour of the elytra."

Since the species they called *vestitus* is evidently undescribed, I have prepared the following description from the specimen sent me by Col. Casey and from others labelled "*vestitus*" by Dietz, and now in his collection at Cambridge:

Smicronyx caseyi, sp. nov.

Elongate-oval, slender. Head, thorax, suture of elytra and under surface black; beak, antennæ, legs, apex of thorax and elytra except suture pale reddish-brown; above sparsely clothed with

* Proc. Am. Phil. Soc., XV, 1876, 172.

† Casey, Ann. N. Y. Acad. Sci., VI, 1892, 393; Dietz, Trans. Am. Ent. Soc., XXI, 1894, 159.

oblong white scales, condensed on sides of thorax and in irregular patches on sides of elytra, elsewhere very unevenly scattered; under surface densely clothed with larger, rounded, concave white scales. Beak of male scarcely as long as head and thorax, feebly curved, finely striate, scaly and densely punctate on basal half, naked and more finely punctate toward apex; of female half as long as elytra, smooth, cylindrical, slightly scaly near base. Antennæ in male inserted at apical third, second joint of funicle half the length of first, scarcely longer than third; of female inserted behind the middle, second joint as long as the next two. Thorax slightly longer than wide, sides feebly rounded, disc slightly constricted near apex, rather densely and finely punctate. Elytra one-half wider and three times as long as thorax, sides parallel to apical third, then rapidly converging to a subacute apex; striæ fine, indistinctly punctate; intervals feebly convex, minutely transversely rugose, their setae almost invisible. Length 2 mm.

The range of *caseyi* (*vestitus* Casey and Dietz nec. LeConte) is given as Kansas, Dakota, Colorado and Montana, and it is possible that the specimen donated by Casey is as wrongly labeled as to locality as it is to name. Named in honor of Col. T. L. Casey.

The species recognized by Dietz and in part by Casey as the *Smicronyx corniculatus* of Fahræus,‡ the type of which was from Pennsylvania, agrees fairly well with the original description except in the colour of the elytra, which was given as "nigra, griseo-tomentosa, fusco-nebulosa." As with many other North American species described in Schonherr's work, the types of which are now in Stockholm and therefore difficult of access, there has been much difference of opinion as to what form Fahræus had in hand. In the Cambridge collection are two species placed side by side, each bearing the label "*corniculatus* Fahr." in LeConte's writing. One of these is what we now know as *sculpticollis*, the other as *apionides*, both described by Casey. It was probably from the former that LeConte drew up the description (1876,173) in which he gave the colour as "dark brown, not very densely clothed with narrow small whitish and yellowish scales," and the thorax as "much

‡ Schon. Gen. et Spec. Curc., VII, Pt. II, 1843, 309.

rounded on the sides." Casey (1892, 391) combined LeConte's *squamulatus* with the *corniculatus* as recognized by Dietz and his description is a composite of the two. Dietz (1894, 164) described a form as *corniculatus*, and then mentions four varieties. These, as lettered in his collection at Cambridge, appear to be *a*, a small form of his *nebulosus; c*, the same as described by him as *corniculatus; b*, and *d*, the *squamulatus* of LeConte, of which Dietz's *columbianus* is a synonym. Until the type of Fahræus is studied by some American Coleopterist familiar with our species of *Smicronyx*, the name *corniculatus* may, as well as any other, be ascribed to the form so recognized by Dietz.

A study of the type of *S. lanuginosus* Dietz in the Horn collection shows it to be a dwarf form (2 mm.) of *corniculatus* with the "conspicuous long, hair-like setæ" mentioned by Dietz visible only when viewed in profile, and then scarcely if any more obvious than those of *corniculatus* when similarly viewed. I consider it scarcely worthy a varietal name.

As mentioned above, *Smicronyx squamulatus* LeConte (1876, 173) was treated by Casey as a synonym of *corniculatus*, which it closely resembles, but differs in the maculate elytra, paler antennæ and distinct setæ of both thorax and elytra. Dietz (1894, 177) mentions it as unknown to him, but "probably a variety of *corniculatus*." His types show, however, that he had described it (1894, 162) as *S. columbianus*, and also (p. 165) as varieties *b* and *d* of *corniculatus*.

Smicronyx quadrifer texana, var. nov.

Differs from *quadrifer* Casey in having the scales of upper surface mostly pale brown, the lateral stripes of thorax obsolete on apical third, the median one reaching only to basal third; elytral dark spot beginning at basal fourth instead of basal sixth, with a white line running from its front margin to base along the third intervals; each interval with a row of large, white, inclined scale-like setæ, these absent on the median black spot.

One specimen from Brownsville, Texas; May 25.

NEW LIFE HISTORIES AND NOTES IN PAPAIPEMA SM. (LEPIDOPTERA).

BY HENRY BIRD, RYE, N. Y.

(Continued from Vol. XLVII, p. 151).

Papaipema nelita Strk.

A recent examination of Strecker's type reaffirms our early determination of this species which was made from scanty material, and we can report the larvæ were found at favourable stations in the environs of Chicago, the type locality, in July of the current year. Its association was with the previously recorded food-plant, *Rudbeckia laciniata* L., so far the only known choice. Our larval note in this magazine, Vol. XXXIX, p. 313, where it is assumed from the penultimate stage the young larvæ belong the group showing a continuous dorsal line, needs correction. A summary for stages III, IV, V may reflect, viz.:

These instars correspond to the normal features of the group; head polished, darkened at ocelli, but without the prominent side line; tubercles not large, blackish, IVa does not appear on joint ten; the white dorsal and subdorsal lines are broken at the middle, where the mahogany browny body colour prevails as an encircling ring on the posterior portion of joint three, on four, five, six and seven, becoming paler with each molt; lengths, 15, 18, 21 mm.; May 20-June 15, Chicago (larvæ per A. Kwiat).

At Wilmington, Del., Mr F. M. Jones has encountered *nelita* at various stations, and his rearings of the moth show a small percentage which have the stigmata white marked, in contra-distinction to the type form. If such happen to be of well-developed size, a superficial likeness is very strong with the white marked *P. frigida* var. *thalictri* Lyman, in instances of small specimens of that form. Under an adverse criticism, which would countenance no difference between these truly similar moths, all niceties of larval differentation and departures of male structures would be swept away. So it appears best to give permanent attention to this departure with the Strecker species, characterizing it as variety *linda*.

Papaipema nelita linda, new variety.

Typical in the greyish brown ground colour, with golden brown irroratic ns medially, the purplish basal and postmedial areas; also in maculation; basal spots vague, not white marked, the orl icular and claviform are two rounded white spots, the reniform is a collection of dots around a central curved line, the outermost opposite the cell yellow, the rest usually white; ordinarily the conventional pattern for the white markings except the reniform is proportionately a little short. Expanse 36 mm.

A male type is with the author, a paratype with Mr Jones, and a specimen was forwarded to the British Museum for comparison with the type of *P. limpida* Gn. from which it is reported to be distinct by Sir Geo. F. Hampson. This new variety is dedicated to Mrs. F. M. Jones, whose efforts in behalf of entomological research warrant much more than this slight recognition.

Papaipema cerina Grt.

The apprehension of this larva is due to the efforts of Mr. Chas. Rummel of Newark, N. J., who encounters it occasionally in his locality. We were indebted to his liberality for early staged larvæ the current season, as well as for the privilege of bringing out this note. That this well-known eastern species had escaped larval notice seems due in part to its close resemblance to *P. cataphracta*, that its seemingly preferred food-plant, *Lilium superbum* L., is very generally bored also by the latter, and while it appears certain other plants than Lilium are involved, the similarity to this prototype, whose individuality was considered unique, has allowed it to escape notice. Thus in future generic groupings, the species should be associated with *cataphracta* and *duovata*, a position not assigned it heretofore and which is of some import since on "first species" rule it became Smith's type of the genus.

The larval habit doubtless follows the usual course, the overwintering egg hatching the last week of May. Larval stages IV and V are identical with *cataphracta* except that they are a fortnight in advance of the latter. Characteristics are fully typical, tubercles not large; colour livid purple-brown on which the white dorsal and subdorsal lines are contrastingly drawn without break.

Penultimate stage: Paler and more pinkish, the lines yellowish; tubercle 1 on joints four, five and six the same as on other joints, whereas the ally has them enlarged at this point.

Maturity: Head and plates typical; colour yellowish translucent, with lines entirely obliterated; tubercles mostly minute, I and II, except on twelve are only discernable as the merest dots under a lens, IV alone retains its usual size, and in comparison to microscopic I, II, III and IIIa, seems proportionately large, though it does not exceed the spiracle, on joint ten IVa shows same size as IV, a trifle high, but of similar prominence in bearing seta; length 42 mm.; leaves plant for pupation July 31.

The pupa shows no departure from the usual form, and is less cylindrical than its ally, which normally changes in its gallery and is effected by the confined quarters. Emergence data are not at hand, but from that of flown specimens must centre around the first ten days of September, whereas the near congener is a month later.

Papaipema nepheleptena Dyar.

A recent re-examination of the unique type of this species, coupled with the wider acquaintance by the more extended breeding of *P. mæseri* Bird, (1911) furnishes conviction there is but one species involved, and that the Dyar name has precedence, being proposed in 1908. The type, a flown and rather worn specimen, is from New York, and regrets over our error of determination are now tempered by the establishment of the larval history for this local but heretofore elusive *nepheleptena*. Thus it will appear our larval notes for the Turtle-head borer, Can. Ent., Vol. XLV, p. 120, are to be associated with the latter name. A brief addenda to these may be made for:

Stage I—Cephalic and anal shields well developed, also the the setæ; the first four abdominal segments show as a dark girdle, the extremities semi-translucent.

Stage II—Head is without side line, nor is its continuation on the lower edge of shield yet manifest; the dark girdle not crossed by the white longitudinal lines; tubercles concolorous.

Stage III—Similar, with the generic features now well evident; the dorsal line alone crosses the girdle, showing as the merest white

thread; tubercle IVa on joint ten seems always absent in this species, ten larval preparations at least have it unindicated; lengths, 2.5, 6.5, 11 mm.; May 25-June 18; Buffalo, N. Y. (larvae per H. Baumann).

Papaipema circumlucens Smith.

When the late Dr. J. B. Smith advanced this specific name at the "Revision of Hydroecia," 1899, Trans. Am. Ent. Soc., Vol. XXVI, the knowledge of larval stages was not of avail, and the material for study scanty, and of inferior quality for the most part. Though his efforts for fullness were well directed, and the co-operation of museums and collectors very general, a misconception in regard to the individuality of *circumlucens* has been recognized for some time, in that more than one species was associated among his types. The writer had arrived at a conclusion as to what form Dr. Smith intended his name should apply, but it was not until 1914 that the larval history became positively known in the particular instance it was necessary to cite. Of his "types" and "co-types" we have recently had the advantage of comparing those in the U. S. National Museum, the Barnes and Rutgers collection, while a female co-type was in the possession of the writer. Three species are found to be involved—the Hop-stem borer, one whose chief foodplant is Dogbane; the true *circumlucens*, and *ochropenta* Dyar, a western species with the larva unknown. The Hop-stem borer has already been differentiated as *P. humuli* Bird, Can. Ent., Vol. XLVII, p. 113. We herewith restrict the type of *circumlucens* Smith to the female type specimen of the United States National Museum, which was without doubt a feeder in *Apocynum*, Dogbane, in its larval state, and for the following reasons. Of the six "types" or "co-types," this form predominates; in our own collection a perfect specimen of the Hop-stem borer was labeled merely "*circumlucens*," while a much-worn Dogbane feeder was ticketed "*circumlucens* Sm. female co-type"; *ochropenta* occurs in but one specimen. The other male "type" Washington is *humuli*.

It is needless to add that from the conventional pattern in the group and the nearness of coloration of the forms involved, the oversight at the time of commission is easily understood.

Regarding the life-history, Mr. A. F. Winn, of Montreal, was the first to call our attention to the fact that *Apocynum* was bored by some *Papaipema*, but his observations were made after the larval period, and were without further or specific verification. Several seasons later, in 1914, Messrs. A. Kwiat and E. Beer at Chicago discovered *Apocynum androsæmifolium* L. to be profusely bored there, and kindly forwarded larvæ which seemed different from any previously seen. At emergence there was surprise that the browner and larger specimens matched our co-type of *circumlucens*, while the smaller, yellower ones ran indistinguishably to *baptisiæ* Bird.

The current year the writer had advantage of personal studies of the prairie flora in the vicinity of Chicago, under direction of the local entomologists, and observed *circumlucens* extensively at work. The larva is a gross feeder, tunnelling out the lower stem and a considerable portion of the running rootstock when possible. By the middle of July the wilted or browned foliage is very noticeable, and it becomes one of the easiest species to apprehend. Pupation occurs in the burrow and emergence by the orifice, which has served for frass disposal, and without its further enlargement. A network of silk and fragments chewed from the woody stem encloses the gallery directly above the pupa, through which the moth easily breaks, but such details are somewhat dependent on the kind of food-plant occupied. As is usual where a species is super-abundant, dispersal to other plants may be noticed, and in *Mesadenia tuberosa* Nutt. (E. Beer) frequently, and in *Vernonia fasciculata* Michx. (A. Kwiat) rarely, larvæ were found at work, the former being apparently a true alternative food-plant. Quite a noticeable difference exists superficially between the *Apocynum* larva and that boring *Baptisia tinctoria* L. productive of *P. baptisiæ* Bird, Can. Ent., Vol. XXXIV, p. 109, but the moths intergrade so completely there seems no warrant for the retention of this name even in a varietal sense. Hence *P. baptisiæ* Bird, 1902, falls to *P. circumlucens*, Smith 1899.

The typical, *Apocynum* feeding larva is larger, more cylindric and pink than that we had characterized from *Baptisia*, but it is believed to be due to food-plant conditions entirely. The principal larval features are generically normal.

Stage V—Head without side line, colour dull pink, lines yellowish, the dorsal narrow and alone continuous; tubercles appear dim from being nearly concolorous, IV most prominent, and IVa always defined on joint ten.

Stage VI—Very cylindric, paler, otherwise no change.

Stage VII—Now more robust, tubercles conspicuous by reason of the semi-translucence; IVa has continued on ten, but has never equalled IV. Length, 33, 39, 43 mm. July 15-Aug. 12.

A chief parasite with the species is a Tachina fly, to which attention has been previously called with other species, as being a general check in the genus. Our reference to it as *Ceromasia myoidæa* we learn through the kindness of Dr. C. H. T. Townsend is in need of revision, and on this occasion we may deal with yet another correction. Our understanding of the matter is that the above name refers to a European, or an assumed cosmopolitan insect, but inferentially we would not expect such to be critically involved in the economy of a large American genus, a genus so thoroughly American that a selection of widely differing food-plants in many cases exists with plant genera found only in America. From our limited knowledge of the life history, it appears this fly may be associated only with *Papaipema*, or such similar boring larvæ as flourish at about the same date. Over-wintering puparia do not give up imagos until July, when the borers are of sufficient size to answer their purpose. There appears to be two broods of the flies, though it may be that those over-wintering are merely tardy larvæ in pupating, or possibly to having an unusually large food supply. A fortnight's difference in pupation seems sufficient to cause the later ones to overwinter. Ovi- or larviposition may be merely within the gallery opening, there being opportunity for attachment to the host, as it has frequently to come to the orifice to dispose of frass. Some of the *Ichneumonidæ* have been encountered 20 cm. down in these galleries, but on such occasions it was the pupa which was sought. While the fly larvæ must subsist internally, when about mature they may be found outside the decaying shrunken host from which they move a slight distance to pupate. The pupa is cylindric, with ends rounded, unattached and unprotected in the gallery, colour brown.

This fly is now to be known as *Andrina radicis* Townsend.

Dr. Townsend has been good enough to prepare a characterization which is appended, over his signature.

Andrina radicis Townsend, new name.

Andrina radicis Townsend, new name for *Masicera myoidæa* Coquillett, 1897, Rev. Tach. 114 (nec. *Lydella myoidæa* RD., 1830, Myod. 114)—Holotype labeled by Coquillett as above, loc. District of Columbia, May 16, 1882 (Coll. C. V. Riley).

Holotype, No. 19601 U. S. N. M., female. Allotype, male, Rye N. Y. (H. Bird). Paratypes include six specimens reared by Mr. Bird from several lepidopterous larvæ boring the roots of plants underground; numerous specimens reared by the Bureau of Entomology from several hosts; specimen reared by Mr. W. R. Walton from *Nonagria oblonga* at Harrisburg, Pa.; and TD4468, female, Beverly, Mass., July 1, 1875 (Edward Burgess). The last was relaxed and dissected, being the only specimen available that had been collected, not reared. It was found to contain several hundred eggs and maggots. The egg is elongate and bowed. The maggot is without hairs, but with spine-rows encircling the body.

The species differs from *Andrina* (*Paraphorocera* BB. syn.) *senilis* Meigen as follows:—Arista thickened on only basal half; third antennal joint of male sharply angular on upper apical corner, that of female less so; male vertex about equal to eye-width, that of female but little broader; frontal bristles not descending lower than base of arista; face less receding, the vibrissal axis of head nearly three-fourths of antennal axis; microscopic hairs of facialia do not extend one-third way up in male, and less than one-fourth way in female; eyes faintly and thinly hairy. The cheeks are from little over to less than one-fourth eye-height. The species may stand as type of subgenus B of *Andrina*.

Two specimens from England, labeled by Brunetti *Masicera myoidæa*, are apparently *senilis* Meigen (*tincta* BB. syn.). The front and cheeks are much broader in *senilis* than in *radicis*. The female from England was relaxed and dissected, and found to contain the same eggs and maggots in a rather long coiled uterus (TD4469).—Charles H. T. Townsend.

TWO NEW CANADIAN DIPTERA.

BY J. M. ALDRICH, ASST. IN CEREAL AND FORAGE INSECT INVESTIGATIONS, U. S. BUREAU OF ENTOMOLOGY.*

Exorista cæsar, n. sp.

A black and silvery species with black palpi; runs to couplet 5 in Coquillett's Revision, p. 93, but does not have the characters of either alternative of the couplet.

Male—Width of front at narrowest compared with entire width of head gives for 8 males the decimals .263; .308; .233; .271; .263; .254; .268; .300—average, .270. These are micrometer measurements. Ocellars normal, proclinate; frontals 10, rather slender, reaching to the level of the arista; the uppermost stouter and rather far before the vertical; frontal stripe blackish, satiny, wider than either parafacial, the latter subshining above, with erect fine hairs which extend down below the anterior frontals a little; these hairs are most striking above, across the ocellar region; antennæ black, third joint four times as long as the second, extending almost to oral margin; arista thickened about 2-5 its length; parafacials narrow, silvery, bare; vibrissæ at oral margin, above them a short dense row of small bristles extending hardly $^1/_4$ of the way to insertion of antennæ (less in female); bucca about 1-6 the eye-height; palpi black; eyes densely hairy; proboscis short and retracted.

Mesonotum lightly cinereous between the rows of bristles, which are on shining intervals; sides from humeri back more silvery pollinose; dorsocentrals 4 behind, 3 before the suture; inner dc 3 and 3; scutellum with 3 marginal pairs and a small, nearly horizontal apical pair, also numerous long, erect hairs; sternopleurals 3; pleuræ cinereous pollinose; calypters pure white.

Abdomen shining black, anterior half of each segment silvery pollinose, which is not sharply limited and leaves an indefinite median black stripe; first segment with a pair of strong median marginals; second with one or more pairs of discals, a pair of median marginals and a pair of laterals; third segment with one or more pairs of discals, and a marginal row of 10; hairs of abdomen long and erect, more so toward tip.

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Legs entirely black, the brown pulvilli as long as the last tarsal joint on all the feet; middle tibia with one long spine below its middle on outer front side, and usually a small one above it; hind tibia with slightly uneven row of small bristles on outer hind side, one below middle being larger.

Wings almost hyaline; third vein with one or two hairs at base; fourth vein with rounded, oblique curve; apical cell open some distance before wing tip (more than half the distance separating tips of second and third); hind cross-vein rather oblique and bowed outwardly. Apical cross-vein parallel with hind margin.

Female—Front at narrowest compared with entire width of head gives in 5 specimens .360; .345; .327; .303; .322—average, .331. Parafrontals wider than stripe; third antennal joint about three times as long as second; above vibrissæ only a few small hairs; pulvilli short. Hairs of head, scutellum and abdomen not so long and erect as in male; middle tibia with two spines on outer front side.

Length 4.7 to 6.3 mm.

Described from nine males and five females, reared by Prof Lawson Cæsar from *Archips argyrospila* at Simcoe, Ont.; dates of emergence, July 1 to 15, 1915.

I dedicate the species to Mr. Cæsar, and follow the example of Linnæus (in *Lucilia cæsar*) in leaving the specific name in apposition in the nominative case, instead of giving it a genitive ending.

Two specimens of each sex, including the type male, will be deposited in the Canadian National Museum; the remainder will be at the disposal of Mr. Cæsar.

Frontina spectabilis, n. sp.

Female—Easily recognized by a dense coating of golden pollen, which uniformly covers the upper portions of head, thorax and abdomen, except that it is less distinct on the first abdominal segment.

Front of vertex, when viewed from above, as wide as one eye (.333 of entire head by micrometer measurement); ocellars and orbitals normal, proclinate; the frontals form a row of 7 (not

counting the vertical), which extend to the base of the third antennal joint; frontal stripe half as wide as parafrontal, reddish brown; parafrontal with a few small hairs; first and second antennal joints red, the third black, four times as long as second, reaching almost to oral margin, the arista with short penultimate joint, the last thickened almost to middle; parafacials silvery, more yellow above, bare, less than half as wide as the facial depression; facial ridged with a row of 7 coarse bristles, ascending above middle; vibrissæ at oral margin; palpi yellow, rather stout; eyes bare, bucca about one-fifth the eye-height.

Thorax with the pollen gradually becoming cinereous on the sides; dorsocentrals 4 postsutural, 3 presutural; inner dorsocentrals 3 and 3, one pair being just before the suture; scutellum with 3 marginal pairs and a small nearly horizontal apical pair; sternopleurals 3; calypters pale yellow.

Abdomen with pollen changing to gray well down on sides; the specimen shows no adaptations for depositing eggs or larvæ; second segment with a pair of median marginal bristles; third with a marginal row of 8, and some coarse hairs in the place of a discal pair; fourth with a row of 8 on the middle and a few irregular smaller onès at hind margin.

Legs black, middle tibia with one spine on outer front side below middle; hind tibia on outer side behind with an uneven row of small bristles, two near the middle being larger.

Wings hyaline, veins yellow on basal half; first posterior cell open rather near apex, as far from it as one-third the distance separating tips of second and third veins; third vein with 2 or three hairs at base; fourth vein with angle rather abruptly rounded, not appendiculate; hind cross-vein sinuous, nearer to bend than to anterior cross-vein.

Length 7 mm.; of wing, 6 mm.

One female, Wabamic, Ontario, collected by H. S. Parrish, Aug. 5, 1915; deposited in the Canadian National Museum.

I see no difficulty about referring the species to this genus, aside from the fact that the "cilia," or exterior row of bristles, on the hind tibia, are somewhat coarse and uneven.

NOTES ON CHRYSOTIMUS WITH THE DESCRIPTION OF A NEW SPECIES (DIPTERA).

BY M. C. VAN DUZEE, BUFFALO, N. Y.

I took two of these little flies in Northern Ontario, one at Kearney and the other at Brulé Lake on the first and second of August, 1911. They are both males, and are no doubt the male of Loew's *Chrysotimus delicatus*, agreeing with his description in having the antennæ black, palpi yellow, and the posterior cross-vein before the middle of the wing.

It seems to me that the males described by Prof. Wheeler (Psyche Vol. V, p. 375) as the male of *C. pusio* Loew should have been considered a distinct species, as both males and females that he took in Wisconsin had the first two antennal joints yellow, the third brown, as is the case in *C. concinnus* Zett, an European species, but it is not likely that it is that species, as in *concinnus* the cross-vein is before the middle of the fifth vein, while in Wheeler's specimens it is at or beyond the middle, if it answers Loew's description of *pusio* as he states,. I have not seen Wheeler's material and therefore cannot be sure that his specimens represent a new species.

The males of this genus have the abdomen metallic green, while that of the female is mostly yellow. The hypopygium is conspicuous but scarcely bent under the abdomen; in all three species that I have seen it has a small, hairy, black appendage near the centre of the posterior edge

The males of *delicatus* Loew that I took in Canada have the abdomen and thorax bright metallic green with coppery reflections and thin grayish pollen; the hypopygium brown, conspicuous but imbedded, forming a rounded tip to the abdomen, which projects in a point slightly below the venter.

I took one male and three females at Colden, Erie Co , N. Y., Aug. 9th, 1914, which are no doubt the true *C. pusio* Loew. They have black antennæ and brown palpi; the cross-vein is in the middle of the fifth vein as in the male of *delicatus* Loew, but appears a

little nearer the tip of the wing, as the wing seems somewhat shorter. (This character is of little value in separating the species, as the difference is so slight that it would not be noticed without comparing the two). The male hypopygium is rather large and somewhat bent froward, projecting nearly half its length below the venter of the abdomen.

I have received from Prof. J. M. Aldrich a male which evidently represents another species. I do not think it can be the same as the males Wheeler had. The following is a description of this species:—

Chrysotimus flavicornis, n. sp.

Male—Length 1.75 mm. Face and front green with white pollen, which does not conceal the ground colour; ocellar tubercle blackish; palpi brown; antennæ yellow (third joint missing in the type). Thorax pale green with bright coppery reflections and thickly covered with grayish white pollen; prescutellar depression sharply defined; pleuræ black with grayish pollen. Abdomen green with slightly coppery reflections and dulled with gray pollen; hairs and bristles of the thorax and abdomen yellow; hypopygium short, yellowish brown with a black appendage covered with rather long black hairs at the centre of the posterior side; venter yellow. Coxæ and legs yellow. Tegulæ, their cilia and the halteres yellow. Wings tinged with yellow; costa and veins yellow; third and fourth veins parallel beyond the cross-vein; apex of wing equidistant from the tips of the third and fourth veins; posterior cross-vein a little beyond the middle of the fifth vein.

Described from one male taken at Richmond Hill, L. I., N. Y., July 5th, by Mr Daecke. Type in the collection of Prof. J. M. Aldrich.

The yellow antennæ and thick pollen of the thorax and abdomen separate this form the two preceding species. It differs from Prof. Wheeler's description of the supposed male of *C. pusio* Loew in lacking the vivid green of the thorax and pleuræ, the green of the dorsum of the thorax in this species being pale and scarcely shining, and the pleuræ being black.

NOTES ON TYPES OF LEPIDOPTERA IN SNOW COLLECTION.

BY J. McDUNNOUGH, PH.D., DECATUR, ILL.

Through the courtesy of Prof. S.J. Hunter, I recently had the opportunity of examining the types of Lepidop era contained in the Snow Collection at Lawrence, Kansas, and comparing with them specimens taken with me for that purpose. A list of these types is published in the Kansas Univ. Sci. Bull., Vol. VIII (1), 1913, p. 28, and it is with the purpose of correcting a few errors that have been introduced into this paper as well as offering some synonymic notes on several of the species that I have undertaken this article.

The types themselves either bear a large printed label "type" or a label "type specimen, discovered by F. H. Snow," with the locality and a red disk pinned below, but unfortunately, with but few exceptions, the actual name of the species is not attached to the specimen, but pinned alongside, as was formerly the case with Walker's types in the British Museum. Up to the present no great harm has been done as the collection remains as arranged by Prof. Snow, but one can readily see what might happen if an energetic but unscientific student were set to rearranging the collection; the few exceptions noted above are mostly in the Geometridæ and Pyralidæ, a number of which bear Grote's written type label.

In the *Noctuidæ* most of the types are those of species described by Grote from material collected by Prof. Snow in Idaho Springs, Colo., and near Las Vegas Hot Springs, New Mexico, and types of nearly all of these species are stated by Hampson to be in the British Museum and bear Grote's actual type label as I have personally verified. It would seem that whenever Grote received several specimens of one species he retained at least one to which a type label was affixed, but in the case of a unique this was returned to Prof. Snow. In view of this fact, it would be well in my estimation to restrict the type to the British Museum specimen wherever we find types stated to be in both collections, and fortunately this will lead to no confusion, as in every such instance the species represented by the two types is undoubtedly a single one. In

cases where Prof. Smith in his Catalogue of Noctuidæ gives the types as being in the Snow and Neumœgen collections, we think that the Snow Collection should have the preference, Prof. Snow being the original collector. Concerning several species as given in Hunter's list, the following notes may be of value:—

Noctuidæ.

Hadena burgessi Morr.

This is not the type of *burgessi* Morr., but of *discors* Grt., described from Idaho Springs, Colo., in Proc. Kan. Acad. Sci. VII, 64; Prof. Snow had evidently rearranged the collection according to Smith's Check List, in which *discors* Grt. is made a synonym of *burgessi* Morr., for the name *burgessi* Morr. stands alongside a series of three specimens, two of which are true *burgessi* from the East, and the third specimen bears the label "Idaho Spgs., Colo." and the red disk beneath, and is without doubt the type of *discors*, agreeing with the original description in every particular. The species, *discors*, is however *not* a synonym of *burgessi* Morr., and is not even an *Hadena*, but belongs in the genus *Anytus*, with spined hind tibiæ, and will take priority over *vinela* Sm., described from Denver and Glenwood Spgs., Colo. We would call particular attention to the fact that the original description of *discors* Grt. distinctly states that the hind wings have a "black, distinct, incompletely-broken terminal line," and the thorax has "a fine line or collar and tegulæ lined with black," which does not apply to *burgessi* Morr.; various other points in the description of the primaries cannot apply to *burgessi* Morr., but do most distinctly apply to the Colorado *Anytus*.

Oncocnemis major Grt.

Under this name is a specimen bearing the label *Oncocnemis curvicollis* Grt. with red type disk, from Arizona; this may be one of the three originals from which the description was drawn up, but Smith states that the types of *curvicollis* are in the National Museum, Neumœgen and Græf Collections; the matter will bear further investigation. The type of *major* Grt. is in the British Museum.

Chorizagrotis terrealis Grt.

The ♂ type with Grote's handwritten type label affixed is in the collection; we have not been able to match it; Hampson's figure from a drawing of a so-called "type" in the Neumœgen collection is poor and too contrasted; according to our notes the species is a dark indeterminate form with basal dash and slight dark shading between the usual spots; the s. t. line is almost obsolete.

Euxoa verticalis Grt.

The specimen in the collection cannot be considered a type, as it bears the label "Hot Springs, New Mex.," whereas the type locality is Idaho Spgs., Colo.; it is, however, typical. The same remarks would apply to *Richia parentalis* Grt. and *decipiens* Grt.; the true types of all three species are in the British Museum.

Geometridæ.

Emplœcia inconstans Geyer.

Under this heading is included the type specimen of *cephisaria* Grt.; the type of *inconstans* Geyer has, of course, long been lost, and the error is due to Prof. Snow's peculiar system of labelling.

Deilinia perpallidaria Grt.

This cannot be considered the type, which was a ♂ specimen from New Mexico (Snow), whereas the specimen in the Snow Collection, bearing a written label "*Thamnonoma perpallidaria*, n. sp.," is from Idaho Spgs., Colo., and a ♀; besides this, it does not agree with Grote's description, and is a *Macaria* species, I think. Where the true type is I do not know.

Lychnosea helveolaria Hulst.

The type under this heading is that of *aululuria* Grt., which seems correctly placed as a synonym of *helveolaria*.

Hyperitis indiscretata Hy. Edw.

The ♀ type of this species, labelled "*Tetracis indiscretata*, type" by Hy. Edwards himself, proves to be a *Sabulodes* and the same species as that described by Strecker as *Metanema vanusaria* from a single ♂, *indiscretata* taking priority over Strecker's name.

The species is allied to *arcasaria* Wlk., but the apical dark triangle at costal end of t. p. line is much narrower and the t. p. line is almost rigidly oblique; the ♂'s are considerably browner in colour than the ♀'s, which tend towards yellowish.

Sabulodes imitata Hy. Edw.

The ♀ type bears Hy. Edward's hand-written label, "*Antepione imitata*, type." It is closely related to the preceding species, but still more closely to *arcasaria* Wlk., the apical triangle being intermediate in width between *arcasaria* and *indiscretata* and the t. p. line bent as in the former species. *Cestinotata* Tayl., judging by the ♂ and ♀ cotypes from Prescott, Ariz. (not 2 ♀'s from Phœnix, Ariz., as stated in original description, *vide* Can. Ent. XLIV, 275, 1912), becomes a synonym of this species.

Pyralidæ.

Elophila avernalis Grt.

The type specimen bears Grote's written type label; this has been placed by Dr. Dyar in his revision of the Nymphulidæ as *Ab. a* of *fulicalis* Clem. It turns out to be abundantly distinct and the same species as that described by ourselves as *Argyractis? confusalis* (1913 Cont. N. Hist. N. Am. Lep. II (3) 133, Pl. VIII, fig. 11), which thus becomes a synonym. The species was described from two specimens, so that the *two* cotypes (ex Coll. Fernald) from Hot Springs, Arizona (? New Mexico) which Dr. Dyar had before him at the time of the revision are probably spurious; one at least must be, which possibly accounts for *avernalis* being associated with *fulicalis*. We have a long series from New Mexico and Arizona, and find the species very constant.

King Ferdinand of Bulgaria, has been removed from the membership in the Entomological Society of France, which he has held since 1882. His name has also been erased from the membership list of the Petrograd Entomological Society. In this society there has been elected in his place M. Lameere, of Brussels, who is now working in the Paris Museum of Natural History.—*Science*.

NEW GALL MIDGES.

BY E. P. FELT, ALBANY, N. Y.

Below are given descriptions of a miscellaneous lot of gall midges showing a varied food habit and originating in widely separated portions of the world.

Dasyneura sassafras, n. sp.

The midge described below was reared by W. A. Ross, August 12, 1915, from larvæ curling sassafras foliage at Gordon, Ont., and submitted for identification by Arthur Gibson, Chief Assistant Entomologist of the Department of Agriculture, Ottawa, Can. The species runs in our key to *D. apicata* Felt, noticed in detail on page 152 of New York State Museum Bulletin 175. It is easily separated from this form and also the somewhat similar *Dasyneura smilacifolia* Felt by structural and colorational characters.

Female—Length .75 mm. Antennæ extending to the second abdominal segment, sparsely haired dark brown; 16 sessile segments, the fifth with a length two and one-half times its diameter, the terminal segment compound, with a length four to five times its diameter and a more or less distinct constriction near the middle. Palpi; first segment subquadrate, irregular, the second with a length more than twice its diameter, the third a little longer than the second, more slender, the fourth one-half longer than the third, more slender. Mesonotum light yellowish brown, the submedian lines and scutellum yellowish, postscutellum reddish yellow. Abdomen sparsely haired, pale yellowish. Wings hyaline; halteres pale yellowish. Coxæ and femora mostly pale yellowish, the distal portion of femora, tibiæ and tarsi dark brown, the tarsi almost black; claws slender, strongly curved, the pulvilli nearly as long as the claws. Ovipositor pale yellowish, fuscous apically, as long as the abdomen, the terminal lobes with a length nearly four times the width, broadly rounded and sparsely setose apically. Type Cecid. a2676.

Dasyneura gossypii, n. sp.

The small midges described below were forwarded under date of July 7, 1915, by Prof. T. Bainbrigge Fletcher, Imperial Entomologist of the Agricultural Research Institute, Pusa, Bihar,

India. Both sexes are figured on page 363 of his work on South Indian Insects and the species is considered by him as of minor importance. He states that the insect is locally known as the cotton flower bud maggot and the larvæ are recorded as inhabiting cotton buds, causing them to burst and drop. Pupation occurs in the withering buds.

Female—Length .75 mm. Antennæ extending nearly to the base of the abdomen, sparsely haired, pale yellowish, yellowish basally; 12 sessile segments, the fifth with a length about two and one-half times its diameter; terminal segment somewhat produced, with a length three times its diameter and tapering to a broadly rounded apex. Palpi: first segment subquadrate, the second twice the length of the first, more slender, the third three times the length of the second, somewhat dilated, the fourth about three-fourths the length of the third, more slender. Head yellowish, eyes black. Mesonotum pale yellowish brown. Scutellum and postscutellum yellowish. Abdomen yellowish brown, tapering. Wings hyaline; halteres, coxæ, femora and most of the tibiæ whitish transparent, the tarsi mostly pale yellowish, the pulvilli as long as the slender, strongly curved claws. Ovipositor with a length nearly equal to the body, the terminal lobes slender, with a length about four times the width. Type Cecid. a2678.

Walshomyia texana, n. sp.

The midges described below were reared by Mrs. L. T. Binkley, Instructor in Zoology, State University, Austin, Texas, from a bud gall on the wild Texas or Mountain Cedar (*Sabina sabinoides*). The species is quite distinct from *W. juniperina* Felt, reared from the fruit of *Juniperus californica*, and while it presents some differences from the generic type, we believe that it should be referred to this genus.

Gall—This appears to be nothing but an enlarged, brownish bud with a length approximately 6 mm., diameter 5 mm.

Male—Length 2.2 mm. Antennæ extending to the fourth abdominal segment, sparsely haired, pale yellowish; 15 or 16 segments, the fifth with a stem one-half the length of the cylindric basal enlargement, which latter has a length one-half greater than its diameter and tapers slightly distally; circumfili probably

reticulate apically, though not visible in the preparation; terminal segment produced, with a length four times its diameter and tapering to a broadly rounded apex. Palp consisting of one irregularly, broadly oval segment bearing a few stout setæ subapically; eyes large, black, nearly contiguous. Mesonotum a nearly uniform fuscous yellowish. Scutellum yellowish transparent, postscutellum and abdomen light fuscous yellowish and sparsely clothed with fuscous setæ. Wings hyaline: halteres yellowish basally, fuscous apically. Coxæ, a light fuscous yellowish; femora, tibiæ and tarsi a nearly uniform light fuscous straw; claws stout, heavily curved, simple, the pulvilli more than twice the length of the claws, greatly expanded. Genitalia fuscous; basal clasp segment stout, broad; terminal clasp segment moderately long, swollen near the middle and tapering uniformly to the obtuse apex and the irregular base; dorsal plate long, broad, deeply and triangularly emarginate, the lobes narrowly rounded and sparsely setose; ventral plate long, broad, broadly rounded apically. Harpes apparently represented by divergent, broad, slightly chitinized, submedian processes, obliquely truncate and narrowly rounded distally.

Female—Length 3 mm. Antennæ extending to the second abdominal segment, sparsely haired, fuscous yellowish; 14 or 15 subsessile segments, the fifth with a length about twice its diameter, a subbasal whorl of moderately short, stout setæ and subapically low, very irregularly reticulate circumfili forming three or four transverse bands (circumfili distinctly visible in only one specimen, a2694); terminal segment compound, consisting of two or three segments, closely fused and with a length three to five times its diameter; eyes large, black, Mesonotum dark yellowish brown. Scutellum and postscutellum a little lighter. Abdomen yellowish white, sparsely clothed with fuscous hairs. Ovipositor short, stout, the terminal segment with a length one-half greater than its diameter, slightly and variably chitinized basally and ventrally, the terminal lobes broad, broadly rounded and sparsely setose. Other characters nearly as in the male. Type Cecid. a 2693.

Asphondylia sesami, n. sp.

The Gingelly gall fly, according to Prof. T. Bainbrigge Fletcher, Imperial Entomologist of the Agricultural Research

Institute, Pusa, Bihar, India, attacks young Gingelly (*Sesamum indicum*) capsules, producing a wrinkled, twisted gall instead of the fruit. He has figured the adult and gall on page 364 of his work on South Indian Insects, 1914, and classifies this insect as one of the minor pests. He has kindly placed reared specimens, which were labeled South India, Coimbatore, June, 1912, and 1913, at our disposal, and the species is described as new.

Exuvium—Length 4 mm., a nearly uniform chestnut brown except for the nearly transparent antennal cases, the latter extending to the base of the second abdominal segment, the wing cases to the fourth, and the leg cases to the sixth abdominal segment. The dorsum of the abdominal segments with a scattering, and on segments five to eight, respectively, a somewhat double, transverse row of short, stout spines near the basal third and a similar, single row of rather thickly-set, almost contiguous, longer, stout spines near the middle; terminal segment with the basal row of spines distinctly double and scattering, and the distal row irregular, there being three on each side of the median line and a compound, lateral, spiny process.

Male—Length 3 mm. Antennæ extending to the fourth abdominal segment, sparsely haired, light brown; 14 segments, the fifth with a length seven times its diameter, the twelfth with a length nearly five times its diameter, the thirteenth and fourteenth segments missing. Palpi; the first segment irregularly and roundly quadrate, with a length nearly twice its diameter, the second greatly produced, slender, sparsely setose, and with a length nearly three times that of the first. The mesonotum slaty brown, the submedian lines sparsely haired. Scutellum fuscous yellowish brown with a few setæ at the lateral angles, postscutellum a fuscous whitish. Abdomen sparsely haired, light brown, the genitalia fuscous yellowish. Wings hyaline, costa pale straw; halteres basally and apically mostly whitish transparent, the stalk dark brown. Coxæ and femora reddish brown, the tibiæ and tarsi mostly pale straw; claws long, rather slender, the pulvilli as long as the claws. Genitalia; basal clasp segment short, greatly swollen; terminal clasp segment subapical, short, greatly swollen apically and distinctly bidentate; dorsal plate short, broad, broadly and roundly emarginate. Other structures indistinct in the preparation.

Female—Length 3 mm. Antennæ extending to the third abdominal segment, the fifth with a length five times its diameter. the twelfth with a length two and one-half times its diameter, the thirteenth with a length about equal to the diameter, the fourteenth reduced, globose. Palpi; the first segment quadrate, with a length about twice its diameter, the second more slender, irregular and with a length about twice the first. Mesonotum dark slaty brown, the submedian lines rather thickly haired. Scutellum reddish brown, sparsely setose apically, postscutellum dark brown. Abdomen reddish brown, sparsely clothed with silvery setæ. Wings hyaline; halteres mostly yellowish brown, slightly darker subapically. Coxæ and legs mostly brownish straw, the distal tarsal segments somewhat darker; claws moderately stout, strongly curved, the pulvilli a little longer than the claws. Ovipositor when extended probably longer than the body, the basal segment moderately slender and with a well developed dorsal pouch, the acicula slender, acute. Type Cecid. a 2677.

Feltiella americana, n. sp.

The midges described below were received from Prof. P. J. Parrott, of the Agricultural Experiment Station, Geneva, N. Y., under date of July 31, 1915, accompanied by the statement that they were reared from larvæ apparently feeding on a red mite occurring upon plum foliage. This species is quite different from an earlier described American form.

Male—Length 1.5 mm. Antennæ a little longer than the body, thickly haired, mostly whitish transparent; circumfili and numerous long setæ a light fuscous; 14 segments, the fifth having the stems with a length two and one-half and three and one-half times their diameters, respectively; terminal segment, basal portion of the stem with a length four times its diameter, the distal enlargement subcylindric, with a length two and one-half times its diameter, broadly rounded apically. Palpi; the first segment irregular, subquadrate, the second with a length about three times its width, the third a little longer, more slender, the fourth one-fourth longer than the third, more slender. Mesonotum fuscous yellowish Scutellum and postscutellum pale yellowish Abdomen mostly pale yellowish, slightly fuscous basally. Wings hyaline, the third vein uniting with costa at the apex of the wing, halteres

pale yellowish. Coxæ whitish transparent, the legs a fuscous whitish transparent; claws slender, strongly curved, the anterior and mid-pair unidentate, the pulvilli about two-thirds the length of the claws. Genitalia; basal clasp segment moderately long, stout, the basal lobe long, triangular, finely setose; terminal clasp segment long, slender; dorsal plate short, triangularly emarginate, the lobes obliquely and roundly truncate, the ventral plate long, broad, truncate or slightly emarginate apically; style long, stout, roundly acute apically.

Female—Length 1.5 mm. Antennæ nearly as long as the body, sparsely haired, fuscous yellowish; 14 segments, the fifth with a stem one-third the length of the cylindric basal enlargement, which latter has a length about two and one-half times its diameter; terminal segment slightly produced and tapering to a broadly rounded apex. Mesonotum dark yellowish brown. Scutellum and postscutellum yellowish. Abdomen a light fuscous yellowish. Halteres yellowish. Coxæ and femora basally yellowish white, the distal portion of femora and tibiæ a light fuscous straw, the tarsi darker. Ovipositor short, the terminal lobes irregularly ovate and rather thickly setose. Other characters practically as in the male. Type Cecid. a2679.

NOTES AND QUERIES.

Notes from Clemson College, S.C.

On Aug. 8th a large number of specimens of *Anosia plexippus* were taken in a pasture near the College. They were the stragglers of a swarm of this species passing through on that date. They disappeared two days later.

There was an outbreak of Army Worms (*Laphygma frugiperda*) in August. The principal disturbance occurred throughout the northern and eastern counties of the State. As usual, the attack began on crab grass and sorghum. In some sections peas were slightly damaged. The generation went into pupation Aug. 20-30, having done no serious damage. During this outbreak the larvæ of *Calosoma calidum* played an unusually conspicuous role. They

were very abundant in the fields around Glemson, and numerous specimens were sent from various sections of the State for identification. On Aug. 23 the writer collected a large number of specimens to observe their habits in the Insectary. They showed cannabalistic habits, a number of them being killed in this manner, The specimens were kept in jelly glasses containing sand and placed in a dark box. They were fed on Army Worms. On Aug. 25th they refused to eat, and on Aug. 28th they burrowed to the bottom of the sand and changed to the white pupæ, the adults emerging from four to six days later. Farmers sent the black larvæ to find out the name, on account of its good work in destroying the Army Worm.

On Sept. 22nd this office received a report from W. R. Pritchard, Hardeville, S. C., of the great damage being done to his cotton by caterpillars. G. M. Anderson, of this Division, who was stationed at the Columbia laboratory, made a thorough inspection of Mr. Pritchard's farm. He found that the caterpillars were *Alabama argillacea*, and that they were distributed over about fifteen acres of cotton, five of which had been seriously injured. They had nearly all gone into pupation on that date. No other report of damage has come to our attention during the season.

Clemson College, S. C. M. R. Smith.

Notes from New Jersey.

Halticus citri Ashm. injuring phlox in New Jersey (Hemip.). This "flea-hopper," according to "Insects of New Jersey," where it is listed as *Halticus uhleri* Giard, seems to be fairly well distributed over the State, specimens having been taken at Madison, New Brunswick, Jamesburg and Camden County. As no food plants are mentioned, the insects were evidently taken while sweeping. During September, 1915, this species was found injuring phlox growing in a nursury at Riverton. Most of them were found on the under sides of the leaves, and the injury appeared on the upper surface as small, irregular, whitish patches, resulting in a discoloration of the foliage. Dr. F. H. Chittenden mentions it

as attacking chrysanthemum, morning-glory and smilax in greenhouses, while Prof. F. M. Webster records it as feeding on many weeds, such as ragweed, crab grass, smartweed, etc. It is probably known best as a garden pest, being injurious to beans, beets, peas, cabbage, potatoes, etc. Considering the fact that the infestation on phlox was most severe after the blooming period was over and at a time when the plants were no longer cared for as ornamentals, it was not necessary to spray. Had it occurred earlier in the season any of the ordinary "leaf-hopper" remedies would have undoubtedly checked it successfully.

HARRY B. WEISS, New Brunswick, N. J.

Mailed January 13th, 1916.

THE PARSNIP WEBWORM.
(DEPRESSARIA HERACLIANA DEC.)

The Canadian Entomologist.

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POPULAR AND PRACTICAL ENTOMOLOGY.

AN INSECT ENEMY OF THE PARSNIP.

BY W. H. BRITTAIN AND C. B. GOODERHAM, TRURO, N. S.

For a number of years the work of the Parsnip Webworm (*Depressaria heracliana* Dec.) has been noticed on the wild parsnip (*Heracleum lanatum* Michx) growing in the vicinity of the Agricultural College, Truro. In the summer of 1914 an attempt to grow some cultivated parsnips for seed on the College Farm was unsuccessful owing to the attacks of this insect. The shortage in the supply of vegetable seed during the past season, consequent upon conditions in Europe, has given an impetus to the local production of such seed As a result a number of our farmers have planted small plots of parsnips for seed purposes, but with rather disappointing results, as many complaints have reached us of serious damage occasioned by this pest. It would therefore appear that a brief description of the insect, with notes on its life history and habits, would be particularly opportune at the present time.

Description:

The Egg.—Stainton* says regarding the oviposition habits of the insect: "The egg of this species is no doubt deposited in spring on the undeveloped umbels of *Heracleum spondylium* by the hibernated female." Other writers have quoted Stainton in this connection, but though a number of entomologists have informed us that they are well acquainted with the egg, we have not been able to discover any further reference or any description of this stage in the literature at our disposal.

The eggs are small, more or less rectangular in outline, with rough edges, measuring .32 - .40 mm. in length, and .17 -.19 mm. in width. They are pearly white in colour and ribbed longitudinally, as shown in fig. 1.

*Stainton, H. T., Nat. Hist. Tineina, Vol. V, Part 1, 112-113 (1861).

Fig. 1. Parsnip Webworm, mature larva X 6

The Mature Larva.—Length 16-18 mm; diameter of second abdominal segment 3 mm.; width of head 1.75 mm. The shape is nearly cylindrical, tapering slightly towards both extremities. The general colour is greenish yellow above, light yellow on sides and beneath. The head, mouth parts, cervical shield, thoracic legs and spiracles are shiny black.

The head is notched or emarginate on its caudal border and the cervical shield is divided by a median longitudinal line. The body is beset with numerous shiny black setigerous warts or tubercles, as shown in the figure.

The Young Larva.—The larva in its first instar is 1.5-2 mm. long and differs very little from the mature larva except in size and in being a darker greenish yellow anteriorly and a lighter yellow posteriorly.

The Pupa.—The pupa measures 1 mm. long and .3 mm. wide. The thoracic segments are dark brown and the abdominal segments a lighter brown.

The Adult.—The adult is a greyish moth with a wing expanse of $2\frac{1}{2}$ mm. The wings are of a satiny lustre and fringed with long hairs. The front wings are a dark grey with darker longitudinal streaks, the hind wings a uniform light grey. When at rest, the wings are held flat over the back, giving the insect a flattened appearance.

Life History and Habits.

The eggs were first observed this season on June 18th. They are deposited singly and in large numbers on leaves, stems, and particularly on the sheath surrounding the flower heads. The time spent in the egg stage averages about seven days, and the period of oviposition extends over a considerable period, as newly

hatched larvæ were found late in July. On hatching, the young larvæ bore through the sheath and penetrate to the young flower buds inside. Here it commences to feed and to tie the unfolding flowers together with silken threads, forming a slight silken tunnel within which it feeds. When the head at length bursts open, it may, therefore, be nothing but a mass of web with the caterpillars inside. The larva feeds thus for about four weeks upon the seeds and leaves of the plant, and then, having become nearly mature, it crawls down the stem, usually to the axil of a leaf, where it eats its way through the hollow stem and feeds for a few days until it reaches maturity. When mature, the larva builds a light cocoon of silk and excrement within which it changes to the pupal stage. The total length of the larval life averages just under five weeks, there being in all five larval instars. The pupal instar continues for three weeks, most of the adults emerging during the latter half of August, though a few belated individuals may not appear until as late as the middle of September. The adults pass the winter beneath the bark of trees, or in similar shelters. One individual was found in the late winter hidden under a rafter in a disused building on the outskirts of the College Farm.

Of the number of insects reared from the egg to the adult condition complete records were taken in the case of three individuals. This information is summarized in the following table:—

No.	Date of Hatching	Date of First Moult	Date of Second Moult	Date of Third Moult	Date of Fourth Moult	Date of Fifth Moult	Length of Larval Stage	Date of emergence of Adult	Length of Pupal Stage
1	June 25	July 2	July 7	July 12	July 17	July 29	34 days	Aug. 19	21 days
2	June 25	July 2	July 7	July 15	July 20	July 29	34 days	Aug. 19	21 days
3	June 25	July 2	July 9	July 15	July 20	July 29	34 days	Aug. 19	21 days

Geographical Distribution.

The Parsnip Webworm is an insect with a very wide distribution, having been recorded from England, Scotland, Ireland, Germany, Sweden, Finland, France and the Eastern United States and Canada. It is very common in the neighborhood of Truro, and has been sent to the Agricultural College from parts of Hants and King's Counties, as well as from New Brunswick.

Host Plants.

The plant most commonly attacked in Nova Scotia is the Cow Parsnip (*Heracleum lanatum*). The cultivated Parsnip (*Pastinaca sativa*) is usually affected whenever it is grown for seed and the Wild Carrot (*Daucus carota*) is also known to be attacked in America. Besides the foregoing, *Heracleum spondylium* and *Heracleum sibericum* serve as food plants for the insect in Europe.

Natural Enemies.

Riley states that no parasites were bred in the United States by him, but mentions the following which have been recorded by European writers: *Cryptus flagitator* Grv.; *Pimpla heraclei* and *Hoplismenus dimidiatus: Cryptus profligator* Grv. and *Ophion vulnerator* Grv. Bethune was also unable to secure any parasites, but states that the Hairy Woodpecker (*Picus villosus*) destroyed many larvæ and pupæ. Harrison states that the greatest natural enemy is the earwig, which destroys the pupæ.

At Truro we have reared a number of hymenopterous parasites from this insect, but these have not yet been determined.

Remedies.

Bethune suggests dusting with hellebore for controlling the Parsnip Webworm. Riley recommends spraying with arsenate or the destruction of affected stalks. A. J. Cook says that a dilute watering mixture of an arsenate is by far the best remedy; he also recommends dusting with London Purple. Harrison believes in destroying the wild plants and handpicking the parsnip flowers.

Unfortunately we have not yet succeeded in finding any remedy that will completely control this pest, though experiments on a rather small scale were undertaken this season. The habit of the insect in tying up the seed head with silk and working inside a silken tunnel makes the work very difficult.

Spraying with lead arsenate or Paris Green just as the larvæ were hatching had little apparent effect. Dusting with Paris Green 1 part to 25 parts or with air-slaked lime gave somewhat better results, and when the umbels are open, it will prevent them from damaging any new seed. It will not, however, effect the caterpillars in the umbels which have already been tied up with silk. Cutting off and burning affected seed heads, as has been suggested, would

result in the destruction of the whole crop, in places where the infestation is as severe as in the Truro district. Furthermore, it would have little permanent effect where the pest is so numerous on neighbouring wild plants. As for destroying the wild plants that harbour the insects, these are much too numerous to commend the method to the practical farmer.

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Explanation of Plate II.

1. Eggs in place on sheath (insert, single egg greatly enlarged).
2. Larva, lateral aspect; stem cut longitudinally showing larva spinning cocoon.
4. Pupæ, ventral and dorsal aspect.
5. Stem cut longitudinally, showing cocoon and pupæ in situ.
6. Adult moth.
7. Flower head webbed up by larvæ.
8. Holes made by larvæ in stem of Cow Parsnip.

NEW NEARCTIC CRANE-FLIES (TIPULIDÆ, DIPTERA).*

BY CHARLES P. ALEXANDER, ITHACA, N. Y.

The following species of crane-flies were mostly obtained from the collections of the United States National Museum and the United States Biological Survey, through the kindness of Mr. Knab and Mr McAtee. The various species will be figured in forthcoming revisional papers now in course of completion.

Family *Tipulidæ*.
Subfamily *Limnobinæ*.
Tribe *Limnobini*.
Genus *Dicranomyia* Stephens.

Dicranomyia macateei, sp. n.

Female—Length 4.5-4.9 mm.; wing 5-5.5 mm.

Antennæ dark brown. Head dark brownish black, the frontal region more yellowish.

Frontal scutum light yellowish brown, scutellum dull light yellow. Mesonotal præscutum shiny light brown without distinct stripes. Pleura pale yellow, more suffused with brown on the dorsal sclerites. Sternum yellow. Halteres dark brown, a little brighter at the extreme base. Legs with the coxæ bright yellow; trochanters brownish yellow; femora and tibiæ yellowish brown, tarsi pale yellowish white, the terminal segment and the claws black. Wings with a dusky tinge, the stigma distinct, large, oval, brown; the base of the sector, the cord and the outer end of cell *1st* M_2 seamed with darker brown; no pubescence on the apical cells of the wings; veins dark brown. Venation with *Sc* long, extending over half the length of the sector; *Rs* long, over twice the length of the deflection of R_{4+5}; basal deflection of Cu_1 at or slightly beyond the fork of *M*; Cu_2 about equal to the basal deflection of Cu_1.

Abdomen brown, the ovipositor and the eighth segment largely yellow.

Holotype, ♀, Plummer's Island, Maryland; May 24, 1914 (McAtee).

*Contribution from the Entomological Laboratory of Cornell University.
February, 1916

Paratypes, ♀, Virginia, near Plummer's Island; July 14, 1915 (McAtee). 2 ♀'s, Great Falls, Virginia; Aug. 11, 1915, Oct. 3, 1915 (McAtee).

The type is in the collection of the Union States Biological Survey, the paratypes are in the National Museum and the collection of the author.

Tribe *Antochini*.

Genus *Teucholabis* Osten Sacken.

Teuchólabis lucida, sp. n.

Male—Length 3.5-4.1 mm.; wing 4.2-4.5 mm.

Rostrum and palpi black. Antennæ black. Head black with a thick light gray pubescence.

Pronotal scutum dark brownish black, the caudal margin paler, brown; scutellum pale yellowish white, interrupted medially above by a brownish depression. Mesonotal præscutum shiny black, pilose medially behind, the usual pale interspaces represented only by a small reddish brown area in front, just proximad of the pseudosutural foveæ, and a yellow median patch behind; scutum black shiny, with the median area in front pale yellow and with a short, pale pilosity; scutellum dull yellow, more grayish basally; postnotum black with a gray pile. Pleura light yellowish white with a broad black band extending from behind the pronotum beneath the wings to the base of the abdomen; a large rounded black spot on the sternum just before the middle coxæ and a smaller patch just behind these coxæ; mesosternum suffused with lemon-yellow. Halteres short, pale brown. Legs with the coxæ and trochanters pale testaceous; femora light yellow, the apex broadly blackened and slightly enlarged; tibiæ and tarsi dark brown, the former sometimes paler and narrowly tipped with blackish. Wings narrow, hyaline; stigmal spot brown, rounded, conspicuous.

Abdominal tergites black, the segments narrowly ringed with dull reddish yellow on the caudal margin; sternites blackish on the basal half, paler, yellowish, caudally.

Holotype, ♂, Dalecarlia Reservoir and outlet, District of Columbia; Aug 22, 1915 (McAtee).

Paratypes, 1♂; 1, sex uncertain, topotypic.

The type is in the collection of the United States Biological Survey, paratypes in the collection of the author.

Teucholabis carolinensis, sp. n.

Male—Length 4.2 mm.; wing 4 mm.

Rostrum and palpi black. Antennæ black. Head black with a slight grayish pubescence.

Mesonotal præscutum dark brownish black with a sparse grayish pile, the lateral margins of the segment broadly yellowish brown. Pleura dull brown with an indistinct dark brown stripe extending from the cervical sclerites caudad, becoming indistinct before the halteres; sternites brownish yellow without darker markings. Halteres short, pale, the knob brown. Legs with the coxæ and trochanters dull yellowish; femora dull brownish yellow with the apex rather narrowly blackened; tibiæ yellowish brown, the tips of the hind legs scarcely darkened, the anterior pair narrowly blackened; tarsi black. Wings narrow, nearly hyaline, the stigma quite indistinct, the veins dark brown.

Abdomen brown, the sternites somewhat paler.

Holotype, ♂, South Island, Georgetown Co., S. Carolina; Aug. 19, 1915 (Alexander).

The type is in the collection of the author.

Tribe *Eriopterini*.

Genus *Trimicra* Osten Sacken.

? Trimicra empedoides, sp. n.

Male—Length 5.5-5.8 mm.; wing 7.7-8 mm.

Female—Length 5.7 mm.; wing 6 mm.

Rostrum dull yellow, the palpi brown. Antennæ having the first segment with a gray bloom, the second segment dull yellow, flagellar segments dark brown with the base more yellowish, this bicoloured appearance becoming obliterated on the terminal segments. Head pale yellow with a light gray bloom.

Thoracic dorsum light gray, without stripes, excepting a very indistinct and narrow median vitta on the extreme anterior portion of the præscutum; beneath the gray bloom are three stripes; the lateral margins of the præscutum pale, yellowish; tuberculate pits situated far back on the sclerite, about on a level with the pseudosutural foveæ; the interspaces between the usual thoracic stripes with sparse coarse hairs; scutellum pale flesh colour. Pleura gray and yellow, the dorso-pleural membranes more yellowish. Halteres

rather short, light yellow. Legs with the coxæ comparatively small, pale, sparsely gray pruinose; trochanters dull yellow; femora swollen, brownish yellow, very hairy; tibiæ and the first segment of the tarsus dull brownish yellow, darkened at the apex, the terminal tarsal segments dark brown. Wings grayish subhyaline, the costal region yellowish brown, the veins *C*, *Sc* and *R* yellow, the remaining veins dark brown. Venation with Sc_2 placed very far back from the tip of Sc_1, but distad of the base of the sector; cells R_1 very broad and almost completely filled by the very large pubescent stigma; cross-vein *r* long, oblique, inserted at or slightly beyond the fork of the sector; R_{2+3} long, about subequal to R_2 alone; basal deflection of Cu_1 at the fork of *M*; cell *1st* M_2 closed.

Abdominal tergites brownish gray, broadly margined with yellow caudally; sternites similar ,the pale margins less distinct; hypopygium pale.

The female is similar to the male, but smaller, the stigma very small, and in the allotypic specimen the cell *1st* M_2 open by the atrophy of the medial cross-vein (this latter condition undoubtedly abnormal).

Holotype, ♂, Jemez Springs, New Mexico; altitude 6,400 feet; August 8, 1916 (John Woodgate).

Allotype, ♀, Ardmore, South Dakota; August 10, 1915 (E. G. Holt).

Paratype, ♂, with the allotype; August 5, 1915.

The type and the allotype are in the collection of the author, the paratype in the collection of the United States Biological Survey.

This insect is provisionally referred to *Trimicra*, but undoubtedly represents a new genus, which will be characterized in a later paper.

Subfamily *Tipulinæ*.
Tribe *Tipulini*.
Genus *Tipula* Linnæus.

Tipula (Cinctotipula) apache, sp. n.

Male—Length 12.3-13.1 mm.; wing 11.8-12.2 mm.

Female—Length about 18 mm.; wing 16 mm.

Palpi black. Frontal prolongation of the head short, brown, dusted with gray above and with a narrow, linear, median, yellow,

dorsal line; nasus very long, tipped with long golden hairs. Antennæ with the scapal segments very dark brown, the flagellum black. Front bright yellow; vertex yellow, this colour continuing as a point to the occiput; sides of the vertex and occiput dark brown.

Pronotum dark brown, the scutum with three pale yellow spots, of which one is median in position; scutellum with the lateral angles yellowish. Mesonotal prascutum dark brown with a very broad median light gray stripe, which is narrowly bisected anteriorly by a brown line, the lateral stripes very indistinct, brownish yellow; lateral margins of the prascutum pale brownish yellow; scutum with the median area shiny yellowish white, the lobes black dusted with gray and margined with black; scutellum black, the median third somewhat elevated, testaceous; postnotum dark brownish black, narrowly whitish medially in front. Pleura dark brown, dusted with gray. Halteres blackish, the base more yellowish, the apex of the knob gray. Legs with the coxæ brownish black; trochanters dark brown; femora and tibiæ dark brown narrowly blackened at the apex; tarsi dark brown. Wings infumed with dusky, a dark oval stigmal blotch; a vitreous band before the cord crossing the base of the elongate cell *1st* M_2 and extending into cell M_4; a vitreous spot beyond the stigma in cell *2nd* R_1; a number of short hairs in cell R_5 and the tip of M_1.

Abdominal tergites largely brownish yellow, the caudal margin and the lateral margin except at the base brownish black; ninth tergite dark brown. Sternites similar, the extreme caudal margins of the sclerites with a fringe of pale appressed hairs.

Holotype, ♂, Jemez Springs, New Mexico; altitude 6,400 feet; July 20, 1915 (Woodgate).

Allotype, ♀, South Fork of Eagle Creek, White Mts., New Mexico; altitude about 8,000 feet; August 13 (C. H. T. Townsend); at light.

Paratypes, 2 ♂'s, topotypic; July 12, 1915 (Woodgate).

The allotype is in the collection of the United States National Museum; the type and paratypes are in the collection of the author.

Tipula caroliniana, sp. n.

Male—Length 18-19 mm.; wing 19-21 mm.

Palpi dark brown. Frontal prolongation of the head rather long, light brownish gray. Antennæ with the first segment brown,

the second segment and the apex of the first bright yellow; flagellar segments with the basal enlargement very prominent, blackened, the remainder of the segments dark brown, the apical segments more uniform; antennæ elongated for this group of species. Head brownish gray, clearer and brighter toward the occiput and around the eyes; the vertex with a low tubercle bearing an impressed median line; a circular to transverse impressed mark just behind the base of the antennæ meeting on the middle line before the tubercle.

Mesonotal præscutum light gray, the stripes darker gray to brown, narrowly margined with dark brown; the median stripe is bisected by a pale line, which is likewise margined with brown; scutum brown with two light gray spots on each lobe, the largest lying caudad and proximad; scutellum and postnotum light gray, with a narrow brown median line. Pleura with the dorso-pleural membrane dull yellow, the sclerites light gray with a rounded brown spot just beneath the anterior spiracle and a smaller one on the mesopleura. Halteres light yellow, the knob brown. Legs with the coxæ dusted with light gray; trochanters brownish yellow; femora brown, the apex darker; tibiæ brown, lightest at the base; tarsi brown. Wings with a light gray tinge, the costal cell more yellowish, stigma brown; a brownish blotch at the arculus and the origin of *Rs;* veins and the deflections of veins narrowly seamed with brown; hyaline spots before the cord, beyond the stigma in cell *2nd* R_1, base of R_2 and R_3; a rounded blotch in cell *M* at two-thirds the length of the cell; pale flecks in cell *1st.A*.

Abdominal tergites varying from almost clear yellow throughout to a brownish yellow, the caudal margin narrowly yellowish, the lateral margins narrowly grayish; the base of the tergites with a transverse rectangular coarsely punctured area on either side of segments 3 to 5, somewhat as in *T. discolor* Loew and similar species; second sternite brownish yellow with a large rounded black spot at the base; segments two to five with punctured areas on the sides of the sclerites, on segments two, four and five transverse, on segment three oblique; apical sclerites brown, broadly yellowish on the caudal margin. Ninth tergite yellowish, the caudal margin with a small, shallow, rounded or rectangular median notch, the lateral lobes broad, obliquely truncated; dorsal surface with a

small black chitinized point on either side of the middle line connected transversely.

Holotype, ♂, North Carolina. From the collection of C. V. Riley in the United States National Museum.

Paratypes, 3 ♂'s, topotypic.

The type and a paratype are in the collection of the United States National Museum, the remaining paratypes are in the collection of the author.

This species falls in the same group with *angustipennis* Loew, *balioptera* Loew, *centralis* Loew, *serta* Loew, *septentrionalis* Loew, etc., from all of which it is easily separated by the structure of the male genitalia.

Tipula texensis, sp. n.

Male—Length 11.3-12.5 mm.; wing 11.5-15 mm.

Female—Length 13.4-13.6 mm.; wing 12.5-14 mm.

Palpi dark brown. Frontal prolongation of the head dark brown, with a sparse light gray bloom. Antennæ with the first segment yellowish brown, with a sparse grayish bloom; second and third segments yellow or brownish yellow, the remaining flagellar segments yellow or dark brown basally, the terminal segments more uniformly dark brown. Head light gray, more yellowish on the occiput on either side of the median area; a delicate impressed, median, brown, dorsal line.

Mesonotal præscutum light gray with dark brown stripes, the middle stripe broadly bisected by a vitta of the ground colour, which in turn is split medially by a delicate brown line; lateral stripes almost confluent with the median stripe; scutum light gray, the lobes with an oblique brown mark; scutellum grayish testaceous, with a very delicate median brown line; postnotum light gray with or without a rather indistinct, impressed, median, brown line on the caudal fourth of the segment. Pleura light gray, indistinctly spotted with brown, the dorso-pleural membrane dull yellow. Halteres with the base bright yellow, darkening into brown on the knob. Legs yellow, with a grayish white bloom; trochanters yellow; femora dull yellow, the apex dark brown; tibiæ yellowish brown, only a little darkened at the apex; tarsi dark brown. Wings light gray, the stigma rectangular, brownish yellow; brownish blotches

at the origin of *Rs*, at about mid-length of cell *R* and in the middle of cell R_2; hyaline blotches in cell *R* between the brown spots; a hyaline band before the cord; beyond the stigma in cell *2nd* R_1 and in the bases of cells R_2, R_3 and R_5; tip of cell R_2 hyaline; cells M_1 and *1st* M_2 largely hyaline.

Abdominal tergites brownish yellow, with a very indistinct, interrupted, brownish, dorsal band becoming more distinct behind; a broad sublateral dark brown band on each side, lateral margins of the sclerites broadly, the caudal margins narrowly and indistinctly, whitish; sternites dull yellowish brown, darkest on the seventh and eighth segments; in some specimens indistinctly and interruptedly trivittate.

The female is similar, with the antennal flagellum almost uniformly dark brown; the median abdominal vitta distinct.

The maximum measurements given for the male sex are those of the holotype, a large and finely coloured specimen.

Holotype, ♂, Dallas, Texas; April 7, 1906 (F. C. Pratt).

Allotype, ♀, Kerryville, Texas; March 25, 1908 (F. C. Pratt).

Paratypes, ♂, with the allotype; April 11, 1907; ♀, San Augustine, Texas; March 22, 1908 (E. S. Tucker).

The type and the paratype female are in the collection of the United States National Museum; the allotype and the paratype male in the collection of the author.

Tipula aspidoptera, sp.'n.

Male—Length 13.5-14.3 mm.; wing 13.6-15 mm.

Female—Length 15 mm.; wing 4.9-5 mm.

Palpi brown. Frontal prolongation of the head brownish gray, nasus short, but prominent with a few scanty hairs at the tip. Antennæ with the three basal segments light brown, the remainder of the antennæ uniform dark brown. Head light gray with a very narrow, indistinct median brown line.

Pronotal scutum light gray, the scutellum largely yellow. Mesonotal præscutum light gray, the median brown stripe very broad, a little narrowed behind, the lateral stripes rather indistinct; scutum, scutellum and postnotum light gray. Pleura with the dorso-pleural membrane yellow, the pleura clear blue-gray. Halteres long, slender, brown. Legs with the coxæ clear blue-gray; trochanters gray; femora brownish yellow, only a little darkened

at the tip; tibiae yellowish brown, a little darker at the tip; tarsi dark brown. Wings pale brownish gray, the stigma brown, the costal cell brownish yellow; wings streaked with hyaline, this colour including the basal cells and cell R_5 except the tip; cell *1st A* hyaline, except the broad apex.

Abdomen brownish gray, clearer gray laterally, the caudal margin narrowly brownish yellow; ninth tergite broadly tipped with bright yellowish; sternites grayish brown.

The female is similar to the male, but the antennae are shorter, the wings reduced, extending about to the end of the third abdominal segment; valves of the ovipositor rather short, the tergal valves only a little longer than the sternal pair.

Holotype, ♂, Bred from larvae taken at Alvarado, Texas (Hill); issued March 5, 1881.

Allotype, ♀, topotypic.

Paratypes, ♂, ♀'s, topotypic; ♂, Dallas, Texas; April 16, 1906 (W. D. Hunter).

The type, allotype and paratypes are in the collection of the United States National Museum, additional paratypes in the collection of the author.

This interesting species of the *tricolor* group was bred from larvae received in Washington, February 26, 1881, by Mr. Pergande from Mr. Jesse M. Hill, Alvarado, Texas. The specimens were given the lot-number 846 and the first fly issued March 5, 1881, the last on March 22, 1881 a total of some 13 males and 11 females, most of which are still in existence. This insect was determined as *T. cluta* Loew with a question by Coquillett, which, however, has a long-winged female and the antennae bicolorous. In its unicolorous antennae it likewise differs from *Tipula subcluta* Johnson, which has bicolored flagellar segments, as clearly stated in the original characterization of the species, although Dr. Dietz's key is misleading in this regard.

Tipula comanche, sp. n.

Male—Length 11.2 mm.; wing 12.4 mm.

Female—Length 10.9 mm.; wing 11 mm.

Palpi brown. Frontal prolongation of the head rather long, light gray, the nasus very short. Antennae with the first segment

rather long, brownish gray, the second segment yellowish brown, the flagellum elongated, the segments dark brownish black throughout, slightly incised beneath. Head light gray with a narrow, median, brown vitta.

Mesonotal præscutum light gray with three brown stripes, of which the lateral pair are shortened; scutum with the lobes light gray, indistinctly brown in the centre; scutellum and postnotum light gray, the latter more whitish. Pleura with the dorso-pleural membrane yellowish, the sclerites clear blue-gray. Halteres elongate, light brown, the knobs darker. Legs with the coxae pale, with a sparse whitish or gray bloom; trochanters brownish yellow; femora brown, darkened on the apical half; tibiæ and tarsi brown. Wings with a very pale picture, much paler than the similar *eluta* Loew and *aspidoptera* n., and in some respects suggesting *sayi* Alexander; the costal cell is yellowish; stigma rounded, yellowish brown; the membrane of the wing grayish hyaline, darkest on the apex and in the caudal cells; cell R_5 almost hyaline like the basal cells.

Abdomen brownish gray, the lateral margins of the segments broadly dull yellow, the caudal margins narrowly ringed with the same colour; hypopygium yellowish.

Holotype, ♂, Paris ,Texas; April 13, 1904 (A. A. Girault).

Allotype, ♀, topotypic.

The type is in the collection of the United States National Museum, the allotype in the collection of the author.

Tipula guasa, sp. n.

Male—Length 8.5-10.3 mm.; wing 8.5-10.9 mm.

Female—Length 11.2 mm.; wing 9 mm.

Palpi brown, the third segment pale at the base. Frontal prolongation of the head rather short, nasus not very prominent; the prolongation yellow, more brownish beneath, with a subimpressed brown lateral line and a sparse gray bloom on the dorsal surface. Antennæ with the first segment brown, the second segment paler, the apices of the scapal segments pale; flagellum short, dark brownish black, the segments short, broad basally, narrowed toward their tips, the segments not incised. Head dark brown, paler adjoining the eyes, a little grayish on the middle line

of the occiput; in some specimens the head is gray, with only the centre of the vertex dark brown.

Pronotal scutum grayish brown; scutellum clear light yellow. Mesonotal præscutum grayish brown, the area before the pseudosutural foveæ paler, yellowish; the usual lateral stripes are indistinct, but margined narrowly with dark brown; of the middle stripe only a single narrow dark brown line persists; the thoracic stripes in some specimens are quite obliterated; extreme lateral margin of the sclerite grayish; pseudosutural foveæ very large, black; scutum grayish brown, the median area more yellowish, the lobes marked with brown; scutellum testaceous, more yellowish on the sides; postnotum lead-coloured, with a distinct median yellow vitta. Pleura yellow, with blue-gray blotches. Halteres rather short, yellowish brown, the knobs dark brown. Legs having the coxæ yellowish with a gray bloom; trochanters and femora dull yellow, the latter passing into brown on the terminal half; tibiæ dull yellowish brown, darker apically; tarsi dark brown. Wings grayish subhyaline, the costal region a little more yellowish, stigma pale brown.

Abdominal tergites dark yellow, with a very broad median brown band, the caudal margin narrowly ringed with brown; ninth tergite dark brown with the caudal half yellowish; sternites yellow, indistinctly and broadly suffused with brown.

The female has the tergal valves elongate, subacute, dark brown, the sternal valves shorter, more yellowish, acute.

The paratype males from Calvert are much larger (the largest measurements given above) but in all other respects are indistinguishable from the small specimens taken at the type-locality.

Holotype, ♂, Liberty, Texas; March 18, 1908 (E. S. Tucker).

Allotype, ♀, topotypic.

Paratypes, 4 ♂'s, topotypic; 3 ♂'s, Calvert, Texas; April 19. (W. W. Yothers).

The type, allotype and paratypes are in the collection of the United States National Museum, additional paratypes in the collection of the author.

The specific name is that of a native Indian tribe.

Tipula arizonica, sp. n.

Male—Length 9.8-10 mm.; wing 11.3 mm.

Female—Length 14.5 mm.; wing 14 mm.

Palpi pale yellow with black hairs, the third segment with a sparse pale gray bloom, the terminal segment dark brown. Frontal prolongation of the head elongate, shiny yellowish, the extreme base light gray; nasus prominent. Antennæ indistinctly bicolorous, the basal segments light yellow; the third segment yellow, passing into brown on the apical half; remainder of the flagellum dark brown, the basal enlargement a little more intense, the segments slightly incised. Head light gray with a subimpressed, very indistinct median brown line; a row of large hairs following the inner margin of the eye.

Thoracic dorsum opaque light yellow, without distinct stripes, although they may be faintly indicated beneath the bloom. Pleura yellow, with a sparse whitish bloom. Halteres rather short, but slender, brown, the knob a little darkened. Legs with the coxæ yellow, very sparsely white pollinose; trochanters yellow; femora light yellow, soon passing into brown; tibiæ brownish yellow; tarsi brown. Wings hyaline or nearly so, the costal cells yellowish, the stigma a little brownish, veins brown.

Abdominal tergites yellow, the segments three to six more brownish, the segments broadly ringed with silvery; a rounded brown spot on the sides of segment two beyond mid-length of the sclerite; rounded brown spots on the sides of segments three to five at the base; hypopygium brownish; sternites yellow, the sclerites somewhat indistinctly ringed with silvery. Ninth tergite large, the lateral angles produced slightly and bent strongly ventrad; eighth sternite very large, prominent, the apex with a dense brush of yellow hairs.

The female is like the male, but the antennæ are shorter and more distinctly bicolorous; the spots on the sides of the abdomen rather distinct; tergal valves of the ovipositor very long, the tip rounded, the sternal valves very short, the apex abruptly truncated.

Holotype, ♂, Williams, Arizona; May 30 (H. S. Barber).

Allotype, ♀, topotypic; May 29.

The type is in the collection of the United States National Museum, the allotype in the collection of the author.

THE BEES OF THE CORONADO ISLANDS.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

Out in the Pacific, on the edge of the continental shelf, southwest of San Diego, California, are the Coronado Islands. They consist of four rocky elevations, submerged mountain-tops apparently; the largest, South Island, about two miles long. They belong to Lower California, and hence are part of Mexico. Formerly they were difficult of access, but now a small vessel makes daily trips from San Diego, and tourists visit the islands in numbers. On August 21, 1915, my wife and I spent two hours on South Island, collecting the hitherto unrecorded insect-fauna, and especially the bees.*

Such isolated spots are extremely interesting to the evolutionist. Their fauna and flora may throw light on the rate of modification of species, or they may preserve formerly widespread, but now nearly extinct, types. The vertebrates of the Coronados have already been rather carefully studied. They possess a mouse, *Peromyscus maniculatus dubius* Allen, which occurs elsewhere only on Todos Santos Islands, Lower California. It is a relatively large, dark form. The birds, 22 species, have been fully discussed in a very interesting paper by J. Grinnell and F. S. Daggett in The Auk, XX, 1903, pp. 27-37. One of them, *Melospiza coronatorum*, is peculiar to the islands, differing from its mainland relative by its much paler ground colour, narrower streaking and smaller bill. Another, *Carpodacus clementis*, agrees with a San Clemente I. form, and differs from that of the mainland by the bulky bill and heavy brown streaking. Thus it appears that the modification, when there is any, may be in quite opposite directions. Nine species of reptiles are recorded by Van Denburgh and Slevin, the most interesting being *Gerrhonotus scincicauda ignavus*, which belongs otherwise to the islands northward, Catalina and San Martin. The plants have been little studied, but a fine Malvaceous species,

*Dr. E. P. Van Duzee, in his account of the Hemiptera of San Diego and vicinity, appears to record species from North Island Coronado but as his preface shows, they came from the north end of Coronado Beach, San Diego, locally called North Island. There is a possible source of confusion here, to be guarded against.

Lavatera (*Saviniona*) *insularis* Watson, is peculiar to the islands. We found that one of the commonest species on South Island was *Hazardia berberidis* Gray, described from All Saints Bay, Lower California, and not found in the United States. I am indebted to Mrs. K. Brandegee for its identification. This is not the place to discuss the flora at length, but it may be added that already introduced weeds are becoming abundant in places, more particularly the European grass *Achyrodes aureum* Linn. (det. Agnes Chase). An abundant native fern proved to be *Pellæa andromedæfolia* Kaulf (det. Maxon).

We found a single species of snail, *Micrarionta stearnsiana* Gabb, in great abundance. It is a species characteristic of Lower California, extening up the coast to the region about San Diego.

Among the insects, by far the most conspicuous species, occurring in great numbers, was a very fine *Pepsis* with red wings. I cannot, at present, separate it from the common *P. formosa* Say (*chrysothemis* R. Luc.), though it seems somewhat different from a specimen collected in New Mexico. These wasps were observed to prey on the large "tarantula" spiders, which apparently belong to *Avicularia californica* Banks, described from near San Diego. Other wasps taken were an *Odynerus* and an ordinary-looking black *Priononyx*. The common ant of South Island is *Messor andrei* Mayr. The only butterfly seen, but this abundant, was *Lycaena exilis* Boisd.; a little larger than the form of the species found in New Mexico. A specimen of *Hippodamia convergens* Guér. was collected. Various other insects, some of which look interesting, will be reported on at a later date, when they can be determined.

The bees number seven species, of which three are new, but one of them was also taken on the Californian coast. There are only two genera.

Anthophora californica Cresson.

One male, at flowers of *Hazardia berberidis*. A form with hair on thorax above paler than usual. Eyes yellowish green in life.

Anthophora urbana Cresson.

One male. A variety with dark tegulæ.

Halictus catalinensis Cockerell.

Five females. The abdominal hair-bands vary from fulvous to greyish white. The species was described from Catalina Island.

Halictus coronadensis, n. sp.

Male—Length about 6.5 mm.; slender, head and thorax dark green, abdomen very obscurely greenish, almost black; hair of head and thorax moderately abundant, erect, pure white; clypeus greatly produced, the free lateral margins not much less than half diameter of apex; malar space short; mandibles with a ferruginous subapical band; hair of face beautifully plumose, dense at sides; supraclypeal area shining yellowish green; eyes deeply emarginate; front dull; ocelli rather large; antennæ very long, flagellum light fulvous beneath; mesothorax dull, with a minutely granular appearance; scutellum shining, sparsely punctured; area of metathorax with very fine radiating striæ, and no sharp edge; posterior truncation not sharp-edged; tegulæ fulvous, dark at base; wings ample, hyaline, faintly greyish, stigma and nervures dusky brown; outer nervures not weakened; first r. n. joining second s. m. a short distance before end; third s. m. much broader above than second; legs black, the femora green behind; abdomen dull, appearing minutely granular, constricted at the ends of the first three segments, the extreme margin coppery-red; no bands, but surface of abdomen, especially at sides, with conspicuous erect hair; ventral segments not modified, except that the sixth has a delicate median raised line.

Type locality, Coronado Islands, L. Calif., Aug. 21 (*T. and W. Ckll.*). Also collected at La Jolla, California, August (*Cockerell*). When I collected these, I supposed I was getting males of *Halictus catalinensis*, of which the females occurred at the same place on the Coronado Is., but on examination it is impossible to associate the insects, which differ in many particulars, but especially in the shape of the face. The male of *H. catalinensis* is presumably more or less like that of the allied *H. provancheri*, but the new form is entirely different from *provancheri*. It appears to be a quite isolated form, standing between *Halictus* and *Augochlora*. The strongly emarginate eyes would suggest its reference to *Augochlora*, but the venation and coloration are those of *Halictus*.

Halictus grinnelli, n. sp.

Female.—Length about 5.5 mm.; robust, head and thorax olive green, abdomen and legs black; pubescence white, not very

abundant; head broad; clypeus not much produced, the lower half black; supraclypeal area brassy; front and sides of face well punctured, the middle of front as closely punctured as possible, not striate; antennæ black; cheeks shining; mesothorax shining, strongly and rather closely punctured all over; scutellum closely, more finely punctured; area of metathorax strongly sculptured all over with anastomosing ridges, producing a finely reticulate effect; tegulæ rufofuscous with paler margins, impunctate; wings hyaline, not reddish; stigma and nervures reddish testaceous; hind spur with three long blunt spines, the basal one remarkably long; first abdominal segment smooth and shining, though minutely punctured; the other segments duller and more punctured, those beyond the second pruinose with pale hair.

South Island, Coronado Islands, L. Calif., Aug. 21 (*T. and W. Ckll.*). Five females, visiting Compositæ. One would not take this for a southern or desert species; it rather has the aspect of those of the mountains and of the north. It falls near to *H. perpunctatus* Ellis, but has the mesothorax more coarsely and less densely punctured, wings not reddish, area of metathorax shorter, etc. A related but quite distinct form, which Mrs. M. D. Ellis has named in manuscript as a subspecies of *H. perpunctatus*, occurs in Southern California. I have named this species and the next after the naturalists to whom we are indebted for an excellent account of the birds of the Coronado Islands.

Halictus daggetti, n. sp.

Male—Length about 5.5 mm.; head and thorax olive green, abdomen black; pubescence white; clypeus moderately produced; face and front hairy; antennæ very long (reaching middle of metathorax), flagellum rather thick, ferruginous beneath, narrowly so on the apical part; inner orbits submarginate; mesothorax and scutellum brilliantly shining, well punctured, sparsely on disc of mesothorax; area of metathorax sculptured essentially as in *H. grinnelli;* tegulæ shining piceous; wings milky-hyaline, stigma testaceous bordered with fuscous, nervures fuscous, second s. m. narrower above; mesopleura closely punctured; legs black, with pale hair; abdomen shining, but finely and rather closely punctured, with erect pale hair, especially conspicuous at sides; the suture

between the first and second dorsal segments deeply constricted, that between the second and third moderately constricted.

South Island, Coronado Islands, Aug. 21, three males (*T. and W. Ckll.*). I at first supposed that this was the male of *H. grinnelli*, but the thorax and wings are so different that it seems necessary to regard it as a distinct species.

Halictus nevadensis Crawford.

One female taken; a little larger than the mainland form, which is apparently the commonest small green *Halictus* of Southern California. I took the species at the Scripps Institute, La Jolla, and at Orange.

NOCTUID NOTES FROM WESTERN CANADA, WITH DESCRIPTION OF TWO NEW SPECIES AND A VARIETY.

BY F. H. WOLLEY DOD, MIDNAPORE, ALTA.

Cucullia omissa, sp. nov.

Closely allied to *asteroides* Guen. and *postera* Guen. It principally differs from *asteroides* in being darker throughout, and having dark secondaries in both sexes. Even the darkest specimens of *asteroides* seem always to have a faint violaceous tinge to the grey of the thorax and primaries, which *omissa* always lacks. The discoidal spots are even less distinct than in *asteroides*. In all *asteroides* which I have examined the secondaries are clean pearly white in the basal half or two-thirds, with a very irregular and narrow dusky outer border in the male, and a broader and darker one in the female. In all my *omissa* the secondaries are fuscous throughout, though palest basally. As is the case in *postera*, or at least in the prairie form of that species, the secondaries are practically alike in both sexes.

In a few of the darkest specimens there is a small discal spot on the secondaries beneath. Some specimens come very near the prairie form of *postera* in colour, but the new species is less maculate and streaky than that, and the discoidal spots are much less distinct, being in fact almost obliterated by the rusty red shade overlaying the cell and areas immediately beyond it. The longitudinal streak at the anal angle, the preceding crescent and cloud,

are exactly as in *postera* and *asteroides*. A dark brown streak bordering the full length of the inner margin exists in all *omissa* under examination, and is usually more obvious than in *asteroides*, much more so than in *postera*, from which it is often altogether absent. Size of *asteroides*.

Described from 13 ♂♂ and 8 ♀♀. Localities: 5 ♂♂, 2 ♀♀, Head of Pine Creek, near Calgary; May 18th (one), June 25th to August 13th, collected by the author; one pair, Windermere, B. C., July 12th, 1907 (the author); 1 ♀, Nelson, B. C. (H. Cane); 1 ♂, 3 ♀♀, Aweme, Man., June 6-14, 1910 (Criddle); 6 ♂♂, Cartwright, Man. (Heath collection); 1 ♀, Hymers, Ont., July 11th, 1912 (H. Dawson); and 1 ♀, Breezy Point, N.H., July 2-9, 1912 (L. W. Swett).

Types — ♂ in the author's collection, ♀ in that of Dr Wm. Barnes. Both Calgary specimens. My notes tell me that there is a specimen of this species in the British Museum from Denver, Colo., as well as typical *asteroides* from the same locality. I also have a Denver *asteroides* in my own collection.

Omissa is the No. 359 of my Alberta list, originally entered as *postera* on Smith's authority, and is the *postera* of the Kootenai and B. C. lists (Can. Ent., XXXVII, 227, June, 1905, and XLV, 94, April, 1913). The Manitoba specimens, some of which I am making co-types, are the darkest of the lot both in primaries and secondaries, and compared with Calgary, B. C., and Ontario specimens, have less of the rusty red through and beyond the cell, and contrast more strongly with *asteroides*. In fact, though I choose the actual types from Calgary, it was a study of Manitoba material which finally decided me that the form was distinct. I found a short series of both *omissa* and *asteroides* in the Heath collection, and Mr. Wallis kindly loaned them to me for study. They were all on short pins, and it is reasonable to suppose that they were collected at Cartwright, especially as both have been taken at Treesbank, about fifty miles distant.

Mr. Tams has prepared two mounts of male genitalia of *omissa*, from Calgary and Aweme, and we have compared them with two of *asteroides* from Chicago and Cartwright, and one of British *asteris*, which agrees closely with Pierce's figure and description. The two *omissa* differ from the two *asteroides* in one

detail, and in that detail the deviation in the former is distinctly in the direction of *asteris*, which it resembles very closely in these organs. In *asteris*, as Mr. Pierce expresses it, "the clavus is produced to a small irregular knob, spinose." In *omissa* there is a distinct rounded spinose prominence on the clavus, though it is not similarly produced to a knob. In both my *omissa* mounts this prominence occupies the same relative position on the clavus as it does in Pierce's figure, and the clavus is much the same shape. But in my mount of *asteris* the clavus is shortened off abruptly immediately above the knob. In neither of the mounts of *asteroides* is there anything more than the faintest indication of this prominence. *Asteris* possesses two cornuti on the vesica, whereas *omissa* and *asteroides* possess only one. Superficially, also, the new species resembles *asteris* in colour and arrangement of shades more closely than does *asteroides*.

Copablepharon viridisparsa, sp. nov.

Head, thorax and primaries almost white with a very pale tinge of greenish ochreous, most pronounced in the female. The primaries have a slight irroration of grey scales, most numerous in the male, giving them a slightly sordid appearance. The male has a transverse posterior row of minute black points on the veins, very faintly indicated. Secondaries dull white in the male, with slight fuscous shadings and a fuscous central cloud; in the female a little darker and more shaded, though the central cloud is not as dark as in the male. Abdomen of the general ground colour of the secondaries in both specimens. Beneath dull white, with a dark fuscous cloud on the upper portion of the primaries from the base to the end of the cell, and extending between veins 2 and 5 nearly to the outer margin. This cloud is darkest in the male. Expanse of both specimens 45 mm.

Described from a single pair. The male from Lethbridge, Alta., July 20th, 1915, at light, by Mr. E. H. Strickland, and loaned to the author by him, and the female taken at Calgary town lights by Mr. T. N. Willing on August 7th, 1902. The ♂ type will be placed in the collection of the Dominion Entomological Department at Ottawa, and the ♀ type is in the author's collection. Both are in fine condition, though the male lacks one antenna.

NOCTUID MOTHS FROM WESTERN CANADA.

The species is the No. 385 of my Alberta List, originally recorded as *absidum*, on the authority of Dr. Fletcher. Another specimen shown me was taken at the same time and place as the female type, and is probably in the collection of the University of Saskatchewan at Humboldt, Sask. I have also seen a female specimen taken in Calgary on August 1st, 1907, by Mr. C. G. Garrett. I am under the impression that the species has been taken by Mr Baird at High River, where *grandis* also occasionally occurs. *Grandis* has also been taken at Lethbridge.

The male antennæ are minutely serrate-fasciculate as in *grandis*. The fore tibiæ in both specimens have two claws, one on each side of the extremity, the inner one the stronger. Nearly all my *grandis* appear to have three claws, or at any rate a claw and a very strong spine on the inner side, and a weaker claw on the outer. My only specimen of *alba* unfortunately lacks fore tibiæ. Sir George Hampson does not mention any species of the genus as possessing claws, merely stating "tibiæ strongly spined." The character may perhaps be somewhat variable, and at any rate the limit between claws and strong spines is not easily defined. The new species appears to come between *grandis* and *alba*. The former is lemon yellow with pure white secondaries, the latter pure white. My notes taken on other collections indicate that neither species is always immaculate, and though the female of *viridisparsa* has stood for many years in my collection as probably new, I have thought it best to await a better knowledge of it and other species of the genus. The receipt of the fine male from Mr. Strickland decides me that it is time the form was recognized by description. Should it ultimately prove to connect with either *grandis* or *alba*, which I think improbable, the name will still hold for it as a variety.

Euxoa thanatologia Dyar. (*Porosagrotis thanatologia* Dyar, Proc. U. S. Nat. Mus., XXVII, 833, 1904). Var. *boretha* Smith, (Journ. N. Y. Ent. Soc., XVI, 86, 1908). Var. *sordida* Smith, (Id. p. 86, seq.). All three described exclusively from specimens collected at Kaslo by Mr. Cockle.

Type form *thanatologia* Dyar. Described from a single female without abdomen. Condensed, the description reads: "Head, collar and thorax uniformly dark mouse grey . . . .

Forewings light grey basally and terminally (subterminally evidently meant, W. D.), "the whole median space blackish discolorous . . . . A black basal dash . . . . Lines not strongly defined . . . . Orbicular circular, dusky filled, reniform pale and narrowly black-ringed . . . . claviform black outlined, dark filled. Subterminal line pale . . . . with black dashes preceding it, especially at interspaces 2-4 and 5-7 . . . Terminal space blackish like the median space." I examined the type in February, 1910, and though I was unable to match it very exactly, it very strongly suggested an intermediate form between some very pale grey, and some very dark uniform brown specimens which I had taken at Calgary. Intermediate forms between these extremes have since been bred. The condition had suggested itself to me when I saw a figure of Dyar's type in the British Museum in the previous year, and seemed quite obvious when I subsequently saw a lot of material kindly loaned me by Mr. Cockle, including another figure of the type.

Var. *boretha* Smith. Described as a species (Condensed description): "Dull smoky brown. Collar inferiorly pale; . . . the pale portion limited above by a transverse black line. Costal region more or less contrastingly paler, tending to yellowish, spots discoloured, yellowish. Cell black filled . . . A black mark below median vein in basal space. Subterminal line of the ground colour, marked by the darker colour of the terminal space . . . preceded by a series of sagittate black marks in the interspaces. Orbicular tending to ovate, yellowish, contrasting. Reniform incompletely black margined, yellow, with smoky central line." Described from 3 ♂♂ and a ♀. Smith adds that the species appears to be allied to *terrealis*. This is explained by the fact that he had on several occasions named Calgary specimens of it "*terrealis*" for me, under which name a form of it appears in the earlier portion of my Alberta List. *Terrealis* is known to me only by the type, a ♂ from New Mexico in the Brooklyn Museum (Neumœgen collection). This has ciliate antennæ, and is referable to the *Rhizagrotis* (*Rhiacia* Hbn.) section of *Euxoa*. A figure of it is pretty well reproduced by Hampson. It is probably allied to *flavicollis* Sm., and I do not associate it with the species now under discussion, nor did I recognize it in Smith's collection. He also

suggests a resemblance to *perexcellens*, though admitting a marked difference in antennæ. The association has occasionally been made by others, with certain forms of it, but seems to me rather far-fetched.

My own notes on Smith's types say that the ♂ is "almost like some *ochrogaster*," and that the ♀, which I was able to match pretty closely, is much greyer, a fact mentioned by Smith. A few weeks later I compared my same specimen with type *thanatologia*, and more than suspected their identity. This has since been confirmed by examination of additional material, including a co-type of *boretha*, in Mr. Cockle's collection.

Var. *sordida* Smith. Also described as a species, picked out of the same lot sent him by Cockle. An extract of the description is: "Dull sordid brown, more or less shaded with black and smoky Collar concolorous, with a black median line. . . . A diffuse black streak through basal space. Cell darker or even blackish, but not solid black filled. Subterminal line marked by a slight darkening of terminal space, and by a preceding series of black interspaceal marks. Claviform narrow, pointed. Orbicular small, round or ovate, ringed with yellowish. Reniform large, edged with black; with an inner ring of yellow scales, and the centre more or less yellowish and discoloured." Described from 1 ♂ and 5 ♀ ♀. He adds that the maculation is like that of some of the species of the *ochrogaster* series. With this remark I entirely agree. He states further: "It differs from *boretha* in the flattened appearance, and in the concolorous orbicular, costa and collar. It varies in the amount of overlay in the median space, one example being almost purplish black." The flattened appearance is characteristic of the female, which sex predominated amongst his specimens called *sordida*. A comparison of the types with *boretha* certainly showed some contrast in the discoidal spots, but I do not think I should ever have ventured a separation upon these characters in anything allied to an Euxoa. My notes say of types: "The male is near some forms of *agrestis*." I matched the ♀ type prettly closely with a Calgary ♂, which up to that time I had held as a unique, though since then I have been able to find links connecting it with the rest of my material. Mr. Cockle has

helped me liberally in this, and lent me, along with other specimens, his *sordida* ♀ co-type.

There remains yet another well-marked form of *thanatologia*, not included in any of the above descriptions, which I now describe as follows:

Var perfida, var. nov. Head, collar, thorax and primaries even dull mahogany brown. A paler shade appears at the base below the median vein, sometimes pale sienna brown, sometimes greyish ochreous. This is usually very faint, diffuse, sometimes extending to the inner margin and sometimes taking the form of an ill-defined basal streak, extending to the outer extremity of the claviform. In some specimens the cross lines are barely indicated, and are rarely very distinct. The defining geminate portions may be just perceptibly darker than the ground, but they may be traceable only by the slightly paler filling of ochreous or sienna brown. Basal half line outwardly crenate in the interspaces. T. a. line almost upright, outwardly crenate in the interspaces. T. p. line with the outer portion obsolete, inwardly crenate in the interspaces, evenly outcurved over the cell, direct from veins 3 or 2 to inner margin. S. t. line indicated by a slightly paler shade, of the same colour as the filling of the other lines and the basal shading. The veins are sometimes just perceptibly darker, and there are sometimes faintly pale intervenular streaks preceding and of the same shade as the subterminal line. Claviform faintly indicated by ochreous scales. Orbicular absolutely concolorous, round or oblique, very narrowly ringed with pale ochreous grey, incomplete superiorly. Reniform moderate, pale ochreous, incompletely paler ringed, with an irregular filling of the ground colour, which is very slightly darker inferiorly. A very fine terminal darker line occasionally present, as is also a slightly paler line at the base of the fringes, which are the least shade paler than the ground colour. Secondaries not differing at all from other named forms of the species, dull fuscous, or faintly ochreous, white, dark fuscous outwardly, fringes whitish.

The number of specimens now before me to which this description applies is ten, all females, and I have never yet seen a male approaching this form. Localities: —Alberta: Calgary (6, 1 bred);

Red Deer River, (1); High River Baird, (1). Manitoba: Miniota, Dennis, (1). B. C.: Kaslo, Cockle, (1).

Type—♀, High River, Alta., Mr. Thomas Baird. This is the darkest and most even of all the specimens, and very closely resembles Holland's plate XXIII, fig. 6, which is unquestionably this form, is probably a ♀, and may be of a Calgary specimen. I consider this the more probable, as I sent Dr. Holland a number of Calgary specimens for figuring in that work, including the present form under the name "*titubatis*" on the authority of Smith. It is the No. 224 of my Alberta List, under the name "*punctigera*," on Smith's later authority (Can. Ent., XXXVII, 54, Feb., 1905). The form has no dead black markings whatsoever, and the general colour is very even. There is no darker basal streak, no indication of darker filling either in the discoidal spots or cell, except occasionally the slight inferior darkening of the reniform, no black dashes preceding the subterminal line, and the terminal space is usually of exactly the same colour as the rest of the ground, or barely perceptibly darker. As a rule, the only real contrast is the reniform. The form is the one predominating at Calgary, very few years having passed when I have not taken at light or treacle at least a few specimens, and always females. Moreover, I have very rarely taken any other forms here, and great was my surprise when I finally traced their connection with some other forms by means of comparison of types, and breeding, and a study of Kaslo material. I have not infrequently received the form from Manitoba and Saskatchewan. It occurs also at Banff, and I am under the impression that I have seen it from Vancouver Island. A few specimens were included in the material referred to as "*punctigera*" in the Kootenai List, though the bulk of the specimens were *perfusca* Grt. (*cocklei* Sm.),* occasional forms of which are certainly not unlike it. One of my Calgary females of *perfida* was taken by me in 1894 in cop. with a small dark red male, unfortunately rather worn, but practically indistinguishable from a small even red *ochrogaster*. For the next twenty years I never took a male at all like it which I did not feel tolerably safe in associating with *ochrogaster*, though I saw a few similar males from Saskatchewan and

*Can. Ent., XLIII, 339, Oct. 1911.

Manitoba, and have some from there now in my collection. The possibility of a mismate by the 1894 male still rendered the association doubtful, until Mr. Tams bred similar specimens from a dark female *sordida*, some of the results of which breeding are referred to in the explanation to Plate II, given below. Its likeness to a red *ochrogaster* is so exact, that, though it well deserves a varietal name, I dare not risk description except from specimens bred from a known parent, and I have not enough of such for distribution at present.

I may summarize by briefly designating the named variations of this species as follows:

E. thanatologia Dyar. Light grey, median and terminal space dark mahogany brown, contrasting. Black sagittate dashes preceding the subterminal line. Known in female sex only.

var. *boretha* Smith. Dull sienna brown, with pale collar and costa. Cell black filled, spots contrastingly pale. Sagittate s. t. dashes. As a very grey female was included under this description, the name should be considered as applying to the red-brown form only. Females of this form appear to be very rare.

var. *sordida* Smith. Uniform dull red-brown or blackish-brown, more or less shaded with black or smoky. Cell darker or blackish. Sagittate s. t. dashes. This is a considerably darker form than *boretha*, and lacks the pale collar and costa. The great majority seen of this form have been females.

var. *perfida* Dod. Even dark mahogany brown with a very few pale ochreous or sienna brown lines and shadings. No black markings. Orbicular and reniform pale ringed, concolorous centrally, the reniform contrasting somewhat. Known to me in the female sex only.

As each of Smith's descriptions was drawn from a series of specimens, no two of which were alike, it seems best to fix the varietal names as nearly as possible fitting the actual types.

The expanse of the species varies from 34 mm. (a captured ♂) to 43 mm., the males as a rule being the smallest. I think this is the most variable Euxoa known to me on this continent, with the

doubtful exceptions of *auxiliars* and *tessellata*. Mr. Cockle has shown me a specimen rather strongly divergent from any I had previously seen, though in conjunction with the rest there are indications that it probably belongs here. It is the specimen referred to as *gagates* Grt. in the Kootenai List, and bore a label on Smith's authority "*balintis*." Though it certainly suggests a dull form of the latter, I think *thanatologia* the more probable. Though I have mentioned that certain variations bear more or less resemblance to several other species, and may possibly be confused with them, the general relationship is perhaps really closer to *ochrogaster* than to any other. The wing form is very similar. In fact, as already stated, I believe males are frequently inseparable superficially, though the larvæ are very different. The male antennæ in *ochrogaster* are usually a little more strongly serrate, but this difference is not reliable. The female abdomen of *thanatologia* is, however, more depressed and laterally cylindrical. *Punctigera* has several nearer allies, though so far as it is yet known, it is a dark brown little-marked form much after the manner of *perfida*, but is a broader winged species, has rougher scaling, and lacks the depressed abdomen in the female. It should be remarked, however, that this latter character varies somewhat in any species, according to the age at death, feeding, and degree of egg development in the individual. *Titubatis* Sm. (= *intrita* Morr.) is another species having a dull mahogany, poorly-marked form, extremely like *perfida* in colour, but it has shorter and more trigonate wings, differs in details of maculation, has more quadrate thorax with heavier vestiture, and very distinctly longer serrations to male antennæ. The confusion of occasional females is quite excusable.

Dr. Dyar refered his species to *Porosagrotis* on the strength of its possessing stout tibial claws. The character is a variable one throughout *Euxoa*, and is not a reliable guide. Smith stated that the form of the male genitalia was the only character which distinguished the genus. I admit not having so far examined them, but surely a genus based on genital structure is scarcely valid. The reference to *Chorizagrotis* was based on the flattened form of the abdomen, particularly in the female, and the narrow, elongate primaries. Sir George Hampson treats the genus as a section of

Euxoa, having male antennæ minutely serrate-fasciculate. In the present species they vary from almost simple fasciculate, to what he would call "moderately" serrate-fasciculate, variation being noticeable in specimens bred from the same female. The general rule for the ♂♂ is, however, minutely serrate-fasciculate as in *auxiliaris*.

Thanatologia flies from the latter end of June till about the middle of September. My earliest record is June 30th.

Explanation of Plates III and IV.

Plate III.

1—*Euxoa querula* Dod, ♂ co-type. Red River, near Gleichen.

2— " *querula*, ♀ type. Red Deer River, near Gleichen. (Can. Ent., XLVII, 36, No. 625, Feb., 1915.) Described under Rhizagrotis, which is treated by Hampson as a section of Euxoa with ciliate male antennæ.

3— " *lagena* Grt, ♂. Stockton, Utah.

4— " *lagena* Grt., ♀. Eureka, Utah.

5—*Cardepia mutata* Dod, ♂ type. Calgary. (Can. Ent., XLV, 29, No. 299, Feb. 1913.) Described under Mamestra, but referred by Hampson (in litt.) as a Cardepia, very near *nova* Smith. By structural characters this reference seems correct.

6—*Scotogramma trifolii* Rott., var. *albifusa* Walk. ♂, Montreal (Winn.) *Trifolii* is referred to *Scotogramma* by Hampson.

7—*Cucullia omissa* Dod, ♂ type. Calgary.

8— " *asteroides* Gn., ♀. Aweme, Man. In collection of N. Criddle.

9— " *postera* Gn., ♀. Calgary.

10— " *montanæ* Grt., ♂. Calgary.

11— " *indicata* Sm., ♂ type. Sheep Creek, near Calgary. I have referred this name to *obscurior* Smith, and both to *florea* Gn. The colour is blue grey, very near that of *intermedia*.

12— " *similaris* Grt., ♂. Didsbury, Alta.

NOCTUID MOTHS FROM WESTERN CANADA.

Plate IV.

1—*Euxoa thanatologia* Dyar, var. *sordida* Smith., ♀. Calgary. The figure is a trifle too dark The only male I have seen as dark as this specimen was taken last summer at Lethbridge, by Mr. Strickland.

2— " *thanatologia*, var. ♀. The type *thanatologia* is something between this and fig. 11. It has the basal and subterminal areas pale grey, as in 11; the median about as dark as the terminal in 2, with more and longer ante-subterminal black dashes.

3— " *thanatologia*, var. ♀. Paler than No. 2 basally and subterminally, with darker median area, and median shade line.

4— " *thanatologia*, var. *perfida* Dod, ♀. The palest I have of this variety.

5— " *thanatologia*, var. ♂. This is very near var. *boretha*, but lacks the pale collar and costa. The ground colour is brownish red, closely approaching the *ochrogaster*-like forms.

6— " *thanatologa* var. ♂. This is a deep red form with ochreous grey ringed spots and shadings, which could very doubtfully have been distinguished from a common form of *ochrogaster* if it had not been bred with Nos. 2, 3, 4, 5 and several others, from eggs laid by No. 1. The introduction into the brood, unobserved, of the very dissimilar larva of *ochrogaster* is not in the least likely. The contrast in colour between the red of 5 and 6, and the brown of 3 and 4, is almost entirely lost in the photograph. The average size of the bred (forced) specimens is a little smaller than usual, though one characteristic of the species is its size variation.

7— " *thanatologia*, var. *boretha* Smith, ♂. Kaslo (Cockle). Pale, very slightly reddish brown. A little darker and better marked only than a ♂ co-type in colln. Cockle. One of the males bred from No. 1 was almost exactly like this, but badly crippled on one side.

8— " *thanatologia*, var. *sordida*, ♂. Calgary. The colour is dark red brown, and the specimen has been compared with the ♀ type, and is very like it, but the type is more ochreous, and has sharply defined s. t. dashes. It is the largest ♂ I have taken.

9— " *thanatologia*, var. *perfida* ♀ type High River, Alta. (Baird.) The specimen is characterized by lack of any contrasts.

10— " *thanatologia* Dyar, var. *sordida*, ♀. Calgary. Like some *perfida* in colour with the addition of numerous fine black markings. This is one of the actual specimens named "*terrealis*" for me by Smith, and referred to in my Alberta List under that name. (Can. Ent., XXXVII, 51, No. 225, Feb. 1905.)

11— " *thanatologia*, var. ♀. Calgary. Rather pale grey, with black and sienna brown lines and shadings. This has been compared with the ♀ type of *boretha*, and is not unlike it, but greyer. It was also compared with type *thanatologia*. See remarks under fig. 2. The actual resemblance of No. 11 is to some forms of *auxiliaris*. I have another Calgary specimen almost exactly like it, but with longer subterminal black dashes. Mr. Cockle has specimens very like this.

It is strange that out of nine imagines bred from No. 1 four of them were rather sharply distinct in appearance from any previously taken at Calgary, viz., Nos. 2, 3, 5, and one like 7.

12—*Copablepharon viridisparsa* Dod. ♂ type.

Photographs by W. H. T. Tams, by whom the bred specimens were reared.

A NEW SPECIES OF *BARYODMA*

BY THOS. L. CASEY, WASHINGTON, D. C.

Because of its apparent economic importance, I have been requested by Mr. Arthur Gibson, Chief Assistant Entomologist of the Department of Agriculture, Ottawa, Canada, to draw up a description of the following species for early publication, in order

that it may be referred to definitely by name in official reports. The species belongs to the *verna* group of *Baryodma*, having the mesosternal process narrow and with fine strong medial carina, and it should follow the Colorado species described by me some years ago under the name *suffusa* (Tr. Acad. Sc. St. Louis, 1906, p. 162).

Baryodma ontarionis, n. sp.

Shining black throughout, the legs barely at all paler, the elytra sometimes, but not always, finely, suffusedly reddish at the apical margin internally; pubescence rather short and coarse, not at all close; head orbicular, with evident but sparse punctures, the eyes very moderate in size and not prominent; antennæ attaining the base of the prothorax, black, moderately incrassate, the outer joints transverse, the last slightly longer than the two preceding combined, the second and third rather long and subequal; prothorax nearly one-half wider than long, widest near the base, which is evenly arcuate, the sides thence feebly converging and moderately arcuate to the apex, the basal angles rounded; surface evenly and moderately convex, with small, remote and irregularly distributed punctures, more closely aggregated in two widely separated and scarcely at all impressed longitudinal lines along the middle; elytra transverse, barely wider, the suture somewhat shorter, than the prothorax, the punctures rather strong and deep, evenly and not very closely spaced; abdomen parallel, punctured nearly like the elytra, the first two tergites broadly and rather deeply impressed, the third very obsoletely, the impressions not differently sculptured; tarsi rather short, slender, piceo-rufescent. Length 2.6-4.0 mm; width 0.78-1.2 mm. Ontario (Ottawa) and Quebec (Coaticook).

This species seems to be rather common, and I have received numerous examples from Mr. Beauline, besides the series recently sent by Mr. Gibson. It differs from *verna* and allied species in not having a well defined pale spot near the inner apical angles of the elytra, and from *suffusa*, in its black elytra, less anteriorly narrowed prothorax and more distinct elytral punctures, besides the less apically incrassate antennæ. It does not seem to resemble closely any European species known to me.

A NEW SPECIES OF CATOCALA.

BY G. H. FRENCH, CARBONDALE, ILL.

Catocala julietta, n. sp.

Expanse of wings three inches. Fore wings gray, a slight yellowish tinge, moderately sprinkled with brown and black scales; a heavy shade below submedian vein, continued outside the reniform to subcostal vein, reminding one of the markings of *C. pura*. Basal dash, a narrow black line reaching to the basal line; basal line heavy to subcostal vein, below this indistinct; t. a. line prominent, the lower part lost in the shade below submedian vein; median shade distinct to the upper end of reniform, from this point indistinct; reniform a pale oval with a central shade line; subreniform nearly white, slightly sordid, closed; orbicular obsolete; t. p. line single, heavy, obsolete or nearly so on costa, teeth opposite cell short as in *C. stretchii*, a pale space inside the t. p. line opposite the reniform; subterminal shade often prominent in Catocalæ rather indistinct here, brownish; a double subterminal line, the inner part less prominent than the outer, the enclosed space pale; a terminal row of intervenular lunules; fringe gray with a basal black line.

Hind wings red, of the shade found on *C. walshii* and *C. stretchii;* outer black band wide, about as in *C. walshii*, the two inner dentations near anal angle sharper than in *C. walshii*, band reaching anal angle in a line; median band a little narrower than in *C. walshii*, about as in *C. stretchii*, reaching only to submedian vein, constricted in its middle and at bend in lower end, band not ending in a sharp point; hairs along inner margin pale smoky; apical spot very pale pink, intervenular points next to the fringe the same, shade, small; fringe white.

The under side similar to its allies, a little more gray on apex of fore wings.

One male, captured in woods near Carbondale, August 23, 1915, by Miss Juliette Hanford, to whom I have dedicated the species. The specimen is in the cabinet of the writer.

While differing in the markings of the fore wings, yet the size, tint of gray and colour and markings of hind wings, would place this species near *C. walshii* in our lists.

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FRANCIS MARION WEBSTER.

Canadian Entomologists had long regarded Mr. F. M. Webster as one of themselves, and the mutual warm friendship and sympathy grew with years. His sudden death in Columbus, Ohio, on January 2nd came, therefore, as a shock to those of us who enjoyed his friendship and benefited by his ripe experience. It was my good fortune to sit with him during the joint "smoker" of the Association of Economic Entomologists and the Entomological Society of America at Columbus, Ohio, after my address on the evening of December 29th, and he left me, laughing in his usual happy manner, to retire for the night. A few hours later pneumonia suddenly developed, and it ran a fatal course with astonishing rapidity.

Although he was born in 1849, in Lebanon, N. H., and had led a strenuous life, his mind was active, his zeal for the extension of his work was stimulating and his broad grasp of the details of his work was undiminished. He belonged to, and was one of, the most worthy of that splendid class of older workers in economic entomology to whom our science owes so much, both by their example and by the thorough character of much of the work they have bequeathed to us.

His first official position was that of Assistant State Entomologist of Illinois in 1882, and he brought with him the rich experience of a keen observer and a practical agriculturist, a mental equipment which always impressed itself upon the character of his subsequent work. From 1884 to 1892 he served as special field agent to the United States Department of Agriculture, and it was largely while working in this capacity that a large part of his best original work was effected. From 1886 to 1890 he was engaged on his well-known investigations in the valley of the lower Mississippi River on the buffalo gnats and their suppression. In 1888 he visited Australia in company with Koebele, who was seeking the natural enemies of the citrus fluted scale, and he also paid visits to Tasmania and New Zealand. His work on the

Hessian Fly and other insects affecting field crops, which established so securely his reputation as an investigator and as an authority on this group of insect pests, was carried out mainly during the years 1891 to 1902, when he held the position of Entomologist to the Ohio State Experiment Station. During 1903-04 he was attached to the Biological Survey of Illinois.

After so many years of fruitful preparation he went to Washington and joined the Bureau of Entomology of the United States Department of Agriculture in 1904, and two years later the section of Cereal and Forage Insect Investigations was created and he was given charge of that important section of the activities of the Bureau. From a single assistant his staff increased to more than fifty trained men, and the last appropriation for his work (1915-16) amounted to $114,500, figures that indicate the zeal with which he devoted himself to his work. He was one of the first to recognise the importance of the establishment of field stations, and at the time of his death he was directing the work of about eighteen such stations in the different States of the Union.

His connection with Canadian entomology was a long and valuable one. The October number of THE CANADIAN ENTOMOLOGIST of 1888 contained his first contribution—a very characteristic letter—his last appeared a week or two before his death. He was elected an Honorary Member of the Entomological Society of Ontario in 1899, and his connection with the Society was one of which he always spoke with pride and genuine comradeship, for it meant an additional bond with some of his best friends. We shall always remember the pleasure of his company and the practical address he gave at the Jubilee Meeting of our Society in 1912, his last visit to Canada. In our work we shall miss his counsel and co-operation, but we shall be stimulated by his example, and he will always be remembered as one who was ever ready to assist and whom we counted it as a privilege to number among ourselves.

C. GORDON HEWITT.

POPULAR AND PRACTICAL ENTOMOLOGY.

ERADICATION OF THE BEDBUG BY SUPERHEATING.

BY W. A. ROSS, FIELD OFFICER, DOMINION ENTOMOLOGICAL LABORATORY, VINELAND STATION, ONT.

Our experience with superheating as an effective method of controlling the Mediterranean Flour Moth (*Ephestia kuehniella*

led us to believe that the same measure would prove to be a specific for the Bedbug (*Cimex lectularius*) and other household insects. In the month of July, 1914, we had an opportunity of testing this likely remedy in a boarding-house, badly infested with *Cimex*, and the results came up to our best expectations.

The house was an eight-roomed, two-storey frame building, situated near Vineland, Ontario, and was furnished with iron and wooden bedsteads, varnished dressing tables, plain and varnished tables, chairs and the usual bric-a-brac. The heating system consisted of a hot-air furnace in the basement, with shafts leading into all the rooms, and a kitchen stove and parlour heater on the first flat.

The fires were started at 9.30 a.m., thermometers were placed in different parts of the house and the temperatures were noted every hour. The following table shows a record of the temperatures in three of the bedrooms on the upper storey:

Time	No. 3	No. 4	No. 5
9.30	78 F.	77 F.	78 F.
10.30	94	82	92
11.30	104	95	102
12.30	114	99	117
1.30	130	109	126
2.30	138	115	136
3.30	146	122	142
4.30	148	127	148
5.30	152	138	149
6.30	162	140	158
7.00	160	140	154
7.30	159	140	153

Outside temperatures: Maximum, 73 F. Minimum 64 F.
Thermometers: No. 3—On wall in 1st infested bedroom.
No. 4—On bed in 2nd infested bedroom.
No. 5—On wall in 3rd infested bedroom.

At 1.30 p m. many of the adults and nymphs had succumbed, and by 4.30 p.m. they were all dead. However, the heating was not discontinued at this point, but was prolonged until 7.30 p.m. because it was considered probable that it would take a longer

exposure to destroy the eggs. The results obtained from this treatment were very gratifying—the bedbugs in all stages were wholly eradicated and the house furniture was not damaged in the slightest degree.

It is more than probable that the above noted temperatures were unnecessarily high, and that the superheating would have been equally effective if the temperature had been maintained between 120 F. and 130 F.

SUNFLOWER INSECTS IN CALIFORNIA AND SOUTH AFRICA.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

On August 16th, 1915, I had an opportunity to collect and study the insects on *Helianthus lenticularis*, the common wild sunflower, at Orange, California. The plants grow commonly by the roadside, where, at this season of the year, they are practically the only wild flowers to be seen. I was unable to find any characters on which to separate the Californian Sunflower from that of Colorado. There was a good deal of variability, thus three plants growing close together showed:

(a). Rays 20, short and broad, obtuse, 34 mm. long, 14 broad, light orange, suffusedly deeper basally.

(b). Rays 21, acute, 29 mm. long, 7.5 broad, coloured nearly as in a.

(c). Rays 18, long, length 40 mm., width 9.5, entirely uniform deep orange. No wild *H. lenticularis* was noticed between San Francisco and Santa Barbara, but the plant was abundant by roadsides in the region round Los Angeles, and also about cultivated fields in the San Diego region.

The object of my investigations was in part to determine, if possible, whether *H. lenticularis* was really a native of California. On reviewing the insect fauna, it appears to show less special adaptation than that on the Rocky Mountain sunflowers, and tends to support the view that the species has been introduced.

The sunflower fauna at Orange, as obtained on August 16th was as follows:

Hymenoptera

Halictus armaticeps Cresson. Six females, collecting pollen.

Halictus nevadensis Crawford. Three females.

Halictus helianthi, n. sp. One female.

Length about 4 mm., anterior wing 3 mm.; head and thorax dark green, abdomen and legs piceous; hind margins of abdominal segments obscurely reddish; pubescence dull white; wings hyaline, iridescent, nervures and stigma testaceous. Head ordinary; eyes converging below; mandibles dark ferruginous, black at base; antennæ dark, flagellum obscurely reddened beneath apically; tegulæ piceous, strongly punctured; mesothorax dullish, finely and distinctly punctured; area of metathorax delicately sculptured.

Microscopic characters: Front densely punctured; a delicate keel between antennæ; tegulæ well punctured; mesothorax reticulated between the punctures, which are well separated on disc; area of metathorax with few, delicately wrinkled plicæ, on a minutely reticulate surface, and with no sharp or shining edge posteriorly; scutellum rather sparsely punctured; abdomen with very minute scattered punctures, close to *H. perparvus* Ellis from Arizona, but *perparvus* differs thus: Mesonotum yellow-green, contrasting with the dark blue-green of rest of thorax (in *helianthi* no marked contrast; mesothorax is an obscure olive green); second and third abdominal segments not, or not noticeably, punctured (in *helianthi* very distinctly punctured in the subbasal region, where the pigmentation is strongest); plicæ of area of metathorax of same general type, but larger and more numerous, and the minute reticulation is stronger and yet more minute, producing the appearance of a very finely malleate surface (in *helianthi*, especially apically, there are very delicate mainly transverse lines); plumose hairs on posterior face of metathorax shorter. (The nearest relative in Southern California is *H. tegulariformis* Crawf., which I took at La Jolla in August; this is larger than *helianthi* and has the mesothorax brighter, yellowish green.)

Agapostemon texanus Cresson. Two females.

Melissodes aurigenia Cresson. One female, collecting pollen; 7 males, three of them denuded.

Pseudomelecta californica Cresson. One female.

Diadasia enavata Cresson. One female, collecting pollen.

The absence of any species of *Andrena* and *Megachile* is noteworthy. A single *Bombus* was seen on the flowers, but not captured. No honey-bees were on the flowers, though they were in the vicinity.

Small Torymids were present; one had been captured by a Thomisid spider.

COLEOPTERA.

Desmoris constrictus Say. Grey sunflower weevils were in some numbers; I did not feel sure on casual inspection that they were identical with our Colorado *D. constrictus*, but Mr. H. C. Fall kindly informs me that they belong to that species.

A single *Diabrotica* was seen.

LEPIDOPTERA.

Eupithecia sp. Small yellow geometrid larvæ were common on the flower heads, feeding on the rays, which they resembled in colour. I bred from one of them a small *Eupithecia*, not yet determined. This is the best example of a specially adapted insect apparently peculiar to the Pacific Coast region, in the series. It may however, have lived originally on one of the native yellow-rayed compositæ.

A single *Pyrameis* was seen on the flowers, but no other butterflies.

HEMIPTERA.

Acholla tabida Stal. Common; one had captured a small *Halictus*.

Determined with the aid of advice from Dr. Van Duzee.

Lygus pratensis L. One.

The absence of *Phymata* was noteworthy.

An aphid of the genus *Macrosiphum* was abundant on the sunflowers in one place. I referred specimens to the University of California, and Mr. Swain, who examined them, considers them "nearest to *M. sonchi* L." They are, however, certainly not *M. sonchi*. *Chrysopa* eggs were found on the aphid-infested plants.

ARACHNIDA.

Spiders, which were numerous on the flowers, included the following, kindly determined by Dr. N. Banks:

Icius vitis Cockerell (Attidæ). Common.

Chiracanthium inclusum Hentz (Clubionidæ).

Tetragnatha laboriosa Hentz. (Tetragnathidæ.)

Runcinia aleatoria Hentz (Thomisidæ.)

Misumana diegoi Keyserling (Thomisidæ.)

The last is a special Californian form, represented, however, by a similar species in Colorado. The first is very widely dis-

tributed in the west; the others are common species of wide range over North America.

In addition to the above, I obtained some small Hymenoptera, etc., which I have not yet tried to determine.

Sunflower Insects in the Transvaal.

Mr. J. Burtt-Davy has been growing the red sunflowers (*H. annuus coronatus*) at Burttholm, Vereeniging, Transvaal, and has found the following lepidopterous visitors to the flower-heads, the first three being the most frequent. I give in brackets the nomenclature of recent revisions:

Plusia orichalcea (*Phytometra orichalcea* Fabricius).

Plusia chalcites (*Phytometra chalcytes* Esper.).

Melicleptria armigera (*Chloridea obsoleta* Fabricius).

Plusia exquisita (*Phytometra exquisita* Felder).

Plusia oxygramma (possibly *Phytometra albostriata* Brem. & Gr.; true *oxygramma* is American).

Zinckenia fascialis (*Hymenia fascialis* Cramer).

Audea catocala (*Ulothrichopus catocala* Felder).

Empusada chrysota Hampson.

Coradrena sp.

Thus it appears that in S. Africa sunflowers attract Plusiinæ exactly as they do in this country.

TWO LOCALITY CORRECTIONS.

In the Canadian Entomologist, October, 1915, pp. 329 and 331, Dr. Dietz described two new species of Tipulidæ, which we had sent to him, viz., *Limnobia gracilis* and *Dicranomyia aquita*, the localities given being "Tsolinoi Lake—about five miles north of Athabaska Lake—July 5th, 1914 (F. Harper) and "Fort Resolution, August 24th, 1914 (F. Harper.)" I have been recently informed by Mr. Harper, who collected the specimens, that the localities should be changed to read as follows:

Limnobia gracilis—Tsal-Wor Lake, Saskatchewan, about eight miles from the north shore of Lake Athabaska, at a point midway of its length.

Dicranomyia aquita—District of Mackenzie, along the south shore of Great Slave Lake.

Arthur Gibson,
Department of Agriculture, Ottawa, Ont.

THE STONEFLIES OF THE GENUS PELTOPERLA.

BY JAMES G. NEEDHAM AND LUCY W. SMITH, ITHACA, N. Y.

This obscure genus of stone-flies is of wide distribution in North America, and it includes a considerable number of species, only two of which have hitherto been made known. The type species *P. arcuata* was described by the senior author in 1899 in the *Proceedings of the Biological Society of Washington*. However, specimens of both adult and larva of this species had long reposed in the Cornell University collection. In 1907 Nathan Banks described a second species, *P. minor*, from British Columbia. In 1912, Professor H. Garman published an excellent figure of a nymph belonging in this genus in Bulletin No. 159 of the Kentucky Agricultural Experiment Station. This specimen was from a rill flowing into Straight Creek near Cary, Kentucky, and was labelled "An Undetermined Stonefly nymph, (No. 3)."

Meanwhile specimens for study have been coming into our hands from various quarters: from Ramapo, N. Y., contributed by Mr. William T. Davis; from Black Mts., N. Carolina, loaned by Mr. William Beutenmuller; from several localities in Georgia, collected by Dr. J. C. Bradley; from Nevada, loaned from the Museum of Comparative Zoology by the curator, Mr. Samuel Henshaw. There are also a few specimens bearing only general locality designation from unknown sources in the Cornell University collections, and along with these a few nymphs from British Columbia, from California, from Arizona, and from Washington, D. C. One species, described below as *P. maria*, from Pelham, Mass., has been collected and reared by the junior author. No good characters have as yet been discovered for distinguishing this nymph from that of *P. arcuata*, or from those of the other species which have not as yet been reared. This paper will therefore be limited to characterization of the adult forms.

Soft-bodied stoneflies such as these make very unsatisfactory pinned specimens. They shrivel like prunes in drying, and, as a rule, the best differential characters offered by the genitalia may be made out only by boiling and softening and expanding the specimens. The colours fade hopelessly, either pinned or in alcohol. Our descriptions of colour will therefore be useful only in so far

as they indicate general distribution of the deeper pigmentation areas. What is described from pickled or mummified specimens as yellow may have been green in life.

This genus includes species varying from 10 mm. to 20 mm. in length, and from 18 mm. to 50 mm. in expanse of wings. It is characterized by the possession of but two ocelli, by having a broadly depressed body, short head retracted under the front of a wide prothorax, long antennæ, and very short caudal filaments that are often hardly longer than the abdomen is wide. The venation of the wings is characterized by numerous costal cross-veins, a short sub-costal vein, not reaching the level of the cord, and the branches of the vein Cu 1 appear to spring from its anterior side.

Nymphs of this genus, so far as observed hitherto, live in spring-fed rivulets under stones. About Ithaca, N. Y., they are not uncommon in such places, and they are abundant in a small southern tributary to Enfield Creek near the mouth of the gorge. The nymphs are unique in form, having a wide thorax, broadly rounded and covered with an appressed pubescence above. The abdomen is narrower and rather short. A few long tapering gill filaments protrude backward singly about the base of the legs, both dorsally and ventrally.

Nine species are here described, of which seven are believed to be new. Only the adults are characterized, and, unfortunately, but one sex is known as yet in the case of several of the species. The accompanying plate will doubtless serve better than the descriptions for distinguishing the species. The drawings of genitalia and of the disc of the prothorax have all been done on uniform scale. They are the work of the junior author.

Two very distinct types of male genitalia occur in this genus. One is represented only by a new species from Nevada, *Peltoperla thyra*. In this, the 9th abdominal segment is abbreviated almost to complete disappearance on the mid-dorsal line; the mid-ventral callosity is a mere crescentric transverse ridge at the base of a deep V-shaped suture, the supra-anal plate is remarkably hypertrophied, elevated, bent forward in the middle, and armed with a pair of lateral expansions beside its knobbed tip (Fig. 14). In the other group, represented by all the other species of which

males are known (Figs. 5, 8 and 11) the 9th abdominal segment is prolonged on the mid-dorsal line; its mid-ventral callosity is elevated on a clavate pedicel; the supra-anal is rudimentary, and the subanal plates are developed as a pair of upcurving hooks, whose tips meet the prolongation of the tergum of the 9th segment.

These differences are so remarkable that in any other order of insects they would doubtless be used to distinguish genera; but here they appear not to be accompanied by corresponding differences in other parts and we must agree with Enderlein that the remarkable differences in secondary sexual characters often found in a series of species of Plecoptera, otherwise uniform, are probably not of generic significance.

There are slight venational differences between species, in the number of cross-veins in certain areas, and in the number of terminal forks of veins Rs and Cu, but in absence of a considerable series of specimens, we have no means of knowing how constant are the apparent differences, and our experience with such characters in this order leave us little confidence in their reliability. *Peltoperla brevis* appears, however, to be the only species in which the radial sector is but once forked beyond the cord. The differences in the form of the apex of the 8th ventral segment in the female is probably the most available criterion of the remaining species. *Peltoperla anna* is the only species which shows no appreciable prolongation of the apex of this sternite: *P. dorothea*, *P. ada* and *P. arcuata* have it successively more prolonged and entire; *P. maria*, *P. cornelia* and *P. cora* have it successively prolonged and with a wide median notch.

The two species hitherto made known are not here redescribed but new figures of them are given in the accompanying plate.

Description of New Species

Peltoperla maria, n. sp.

Length of female 16 mm.; expands 27 mm.

Colour brownish, darker on the sides of the thorax and apex of the abdomen. Head yellowish with a diffused brownish blotch on the disc in front of the ocelli. Antennæ yellowish, paler for a distance beyond the two basal segments, which are thick and brownish. Wings yellow hyaline with brownish veins.

There are some 14 cross-veins in the costal space before the end of the subcosta, and seven beyond. The cross-veins in the median and cubital areas are 5 and 7 respectively. Legs yellowish brown, not distinctly bicoloured; 8th ventral segment of the female slightly produced and broadly emarginate in the middle by a shallow wide notch.

Type—A female in the Cornell University collection from Pelham, Mass., reared on the 20th of May, 1913, by the junior author.

Peltoperla anna, n. sp.

Length of male 13 to 14 mm.; expands 23 mm. Length of female 20 mm.; expands 27 mm.

A yellowish species (possibly greenish in life), having intersegmental darker areas about the bases of the legs and on the sides of the thorax. Head yellow. Antennæ yellowish, slightly darker on the pedicel and on the apical half. Prothorax with pale brown marks just before the middle of the disc and a transverse brownish crescent close to the rear margin. Legs yellow, with a knee-cap of brownish-yellow on the base of the tibia externally, and the tips of the tarsi also brownish. Abdomen yellow, with broad, half-rings of brown margining the ventral segments. A pair of large, brownish blotches almost covers the 9th segment ventrally and the tips of the subanal plates are suffused with brown. Wings yellowish hyaline, with the veins darker.

The 8th ventral segment of the female shows in this species no elongations. The plate is cut squarely across the margin, and scarcely differs in appearance from that of adjacent segments. At the base of the 9th ventral segment of the male, there is a chitinized knob supported upon a short pedicel directed backward. The apex of this segment is slightly produced upward in the rear and covers the bases of the enlarged subanal plates, which are pointed, and reach with their tips the level of the dorsum of the segment. Caudal appendages short, abruptly tapering; each of the segments beyond the 4th basal bears a single, stout, downwardly directed seta.

Types—Male and female, in the Cornell University collection were collected at Burton, Ga., (altitude 1800 feet), on May 21st, 1911, by Dr. J. Chester Bradley.

Peltoperla cornelia, n. sp.

Length of female 18 mm.; expands 30 mm.

Colour brownish-yellow. Head yellow, except for an obscure brownish diffused spot before and between the ocelli. Disc of prothorax pale brownish, obscurely and coarsely rugose. Legs yellowish, with the sides of the femora brown. A dark basal knee-cap covers the tibiæ, with apices of tibiæ and all of the tarsi brown. Abdomen entirely yellow. Wings smoky-yellowish, the veins brown, costal cross-veins closely crowded, there being about 15 before the end of the subcosta and 8 beyond.

The 8th ventral segment of the femora, produced backward to cover about half of the 9th segment, broadly rounded on the sides and very broadly emarginate in the middle, and a wide notch that is hardly more than an undulation of the margin.

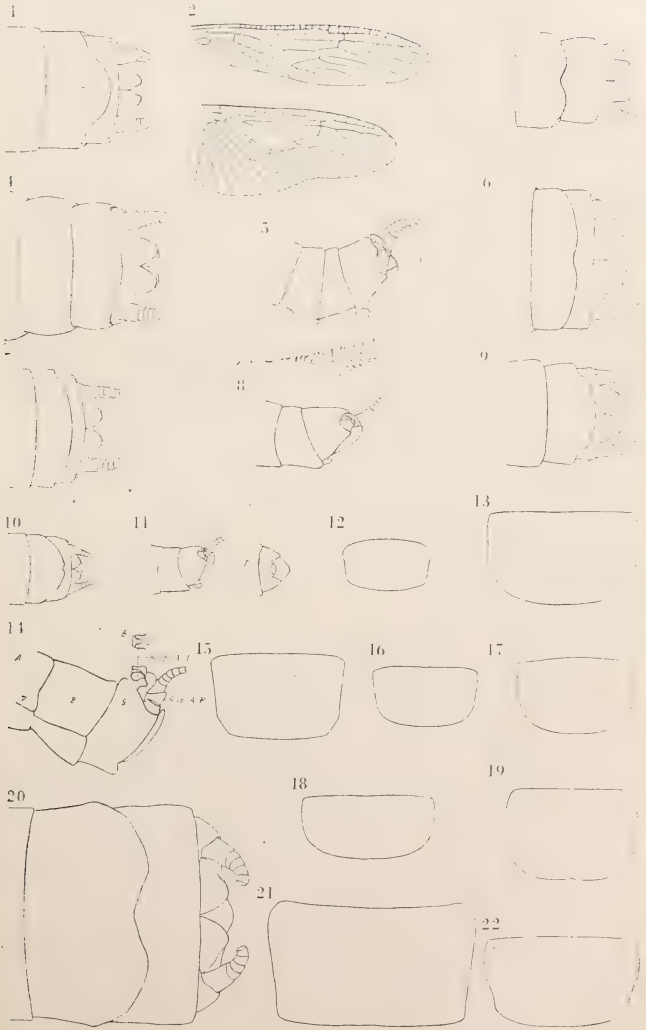
Type—A single female collected at Cornelia, Georgia, on the 5th of April, 1906 (possibly the 4th of May, the label bearing the designation, "5-4").

Peltoperla dorothea n. sp.

Length of male 14 mm.; expands 21 to 28. Length of female 17 mm.; expands 28 to 30.

Colour, pale brownish. Head yellowish, except for a broadly diffused band between the eyes before and between the ocelli. The ocelli are somewhat nearer to the eyes than to each other. Antennæ brownish and distinctly yellowish basally just beyond the 2nd segment. Prothorax, nearly straight across the front margin, with nearly parallel sides and very broadly rounded hind margin. Angles all obtuse. Rugosity upon the disc is few, irregular, and somewhat paler. Thorax and abdomen brownish on the sides, yellow below. Wings smoky-hyaline, with brown veins. Setæ yellow, slightly darker on the tip, densely clothed with yellowish hair and bearing beneath a line of long, stout spines, one on each segment.

The 9th ventral segment of the male bears a conspicuous knob upon a stalk that rises from the extreme base of the segment. The apical border is upturned, partly covering the bases of the sub-anal hooks, which are up-curved, parallel and sharp-pointed, and reach to the rear of the dorsal segment. The 8th ventral segment of the female is entire and moderately produced into a



THE GENUS PELTOPERLA.

broadly-rounded lobe which covers nearly the entire width of the 9th segment, but only the basal third of its length.

The male type is from Ramapo, New York, collected on the 31st of May by Mr. William T. Davis. The female type is in the American Museum of Natural History, and was collected by Mr. William Beutenmuller in the Black Mountains of North Carolina in May. There are several male and female co-types collected at the same time and place by Mr. Beutenmuller.

Peltoperla ada, n. sp.

Length of female, 14 mm.; expands 24 mm.

A slender yellow species. Head wholly yellow. Antennæ yellow at the base, growing somewhat darker beyond the basal third. Prothorax yellow, with indistinct, embossed markings on the disc, shorter than usual, its length being about half its width. Front border nearly straight, sides converging posteriorly, a little border around hind margin. Legs pale yellowish, excepting the extreme tips of the tarsi, which are darker. Abdomen and setæ yellow. The 8th ventral segment of the female produced backward in a broadly rounded entire lobe, which covers two-thirds of the 9th segment.

Type—One female specimen in the Cornell University collection, collected at Black Rock Mountain, Ga., May 24, 1911, by Dr. J. Chester Bradley.

Peltoperla cora, n sp.

Length of female 28 mm , expands 50 mm.

Yellowish brown. Top of head wholly yellow. Distance between ocelli about one-half distance from ocellus to eye. Antennæ pale brown, base pale yellow. Prothorax concave in front, bulging at sides, slightly narrowed posteriorly with obtuse hind angles, hind border straight across middle, sloping backward at sides; length little more than one-half width; margins strongly flaring; disc concolorous, obscurely and sparsely rugose.

Legs mostly brown, tarsi wholly so; femora and tibiæ paler on the sides with margins brown, darker externally.

Abdomen brownish, yellow below, excepting the immense ventral plate of the 8th segment, which almost covers the 9th segment. It is very broad, with wide and shallow apical emargina-

tion. Setæ brown, with yellowish bases, very short and abruptly tapering.

Type.—A single female from Reno, Nevada, in the Museum of Comparative Zoology.

Peltoperla thyra, n. sp.

Length of male 18 mm.; expands 30 mm.

Colour yellowish brown. Head obscure, but a little darker around the ocelli. Prothorax nearly uniform yellowish brown, faintly rugose, somewhat more squarely angled than in the other species, though like the others narrowed posteriorly and somewhat rounded behind. Legs yellow, with tips of tibiæ and tarsi darker. Wings yellowish-hyaline; veins amber-brown; abdomen yellowish, with the apical segments much darker. Setæ yellowish basally, darker towards the apex.

The 9th ventral segment is divided by a U-shaped suture, which separates off the upturned posterior lobe from the basal part of the segment, and just before the suture on the mid-ventral line there is a broad, chitinous callosity that is very different from the knob of the males of the other two species above described. It is not elevated upon a stalk, but merely caps the mid-ventral portion of the hind margin of this basal half of the sternum of the 9th segment. On the dorsal side the 9th segment is broadly excavated on its hind margin, a wide V-shaped notch almost dividing it in two in the median line. The edges of the V are upturned and chitinized. The 10th segment is not visible externally, reduced to a very narrow, thinly chitinized ring that is somewhat wider below. Supra-anal plate remarkably developed, broadened upward, and then recurved forward at its tip, knobbed at the end and bearing two thinner, wing-like appendages at its sides. The median terminal knob is beset with backwardly curved prickles.

The ventral callosity of the 9th segment is crescentic in outline when viewed from below. Within the apex of the 9th segment there are visible a pair of chitinized appendages, the nature of which is unknown. They are divergent basally, parallel and approximate at their tips, and possibly are in the nature of copulatory organs.

Type—Single male specimen from Nevada in the Cornell University collection.

EXPLANATIONS OF PLATE V.

Fig. 1. *Peltoperla arcuata* Needham.—End of abdomen of ♂ adult in ventral view.

Fig. 2. *Peltoperla arcuata* Needham.—Wings.

Fig. 3. *Peltoperla maria*, n. sp.—End of abdomen of ♀ in ventral view.

Fig. 4. *Peltoperla anna*, n. sp.—End of abdomen of ♀ in ventral view.

Fig. 5. *Peltoperla anna*, n. sp.—End of abdomen of ♂ in left lateral view.

Fig. 6. *Pelotperla cornelia*, n. sp.—End of abdomen of ♀ in ventral view.

Fig. 7. *Peltoperla dorothea*, n. sp.—End of abdomen of ♀ in ventral view.

Fig. 8. *Peltoperla dorothea*, n. sp.—End of abdomen of ♂ in left lateral view.

Fig. 9. *Peltoperla ada*, n. sp.—End of abdomen of ♀ in ventral view.

Fig. 10. *Peltoperla brevis* Banks.—End of abdomen of ♀ in ventral view.

Fig. 11a. *Peltoperla brevis* Banks.—End of abdomen of ♂ in left lateral view.

Fig. 11b. *Peltoperla brevis* Banks.—Ninth sternite of ♂ showing median callosity.

Fig. 12. *Peltoperla brevis* Banks.—Outline of prothorax.

Fig. 13. *Peltoperla arcuata* Needham.—Outline of prothorax.

Fig. 14a. *Peltoperla thyra*.—End of abdomen of male in left lateral view.

Fig. 14b. *Peltoperla thyra*.—Extremity of supra-anal plate, viewed from behind.

Fig. 15. *Peltoperla thyra*.—Outline of prothorax.

Fig. 16. *Peltoperla ada*.—Outline of prothorax.

Fig. 17. *Peltoperla dorothea*.—Outline of prothorax.

Fig. 18. *Peltoperla maria*.—Outline of prothorax.

Fig. 19. *Peltoperla anna*.—Outline of prothorax.

Fig. 20. *Peltoperla cora*.—End of abdomen of female in ventral view.

Fig. 21. *Peltoperla cora*.—Outline of prothorax.

Fig. 22. *Peltoperla cornelia*.—Outline of prothorax.

NOTE ON AN INTERESTING CASE OF TWO GENERATIONS OF A PARASITE REARED FROM THE SAME INDIVIDUAL HOST.

BY P. H. TIMBERLAKE, U. S. DEPT. AGRICULTURE, BUREAU OF ENTOMOLOGY, CEREAL AND FORAGE INSECT INVESTIGATIONS.

In the course of investigations of *Dinocampus americanus* Riley), a common Braconid parasite of many of the larger species of Coccinellids, conducted in relation to cereal and forage crop insects, several interesting features have developed, not the least important of which is the discovery that parasitism is not invariably fatal to the beetles.

On September 5th, 1914, a beetle of *Hippodamia convergens* in one of the writer's experiments was found giving issue to a parasite which in due course of time spun its cocoon beneath the host. The beetle, a large vigorous female behaved in the usual manner of parasitized specimens, clinging tenaciously to the cocoon and remaining in a comatose condition for several days. On the seventeenth of the same month it was found wandering about the vial rather feebly, but of its own volition, as if in search of food, having recovered to a large extent from its lethargy. The beetle consequently was fed with aphids and was seen to eat freely. Within a few days it largely recovered its strength, seemed to be perfectly healthy and ate freely whenever fed. On the eighth of October, however, it was found in a weak condition and died shortly afterward, having fallen a victim apparently to a common disease of Coccinellids, which in its manifestations is somewhat similar to the wilt disease of caterpillars. The beetle subsequently was subjected to a thorough examination and dissection. The wound on the dorsal side of the abdomen at the apex through which the parasite had escaped was found completely healed over by the deposition of black, chitinous matter. The ovaries were developed considerably more than they could have been when the parasite issued, although far from producing eggs, and in the abdominal cavity the molt skin of the first stage larva was found.

In the meantime out of a few beetles of the same species collected on September 22nd and 23rd at Salt Lake City, Utah, one

male on dissection was found to contain the remains of a first stage larva of the parasite. The remains, consisting of the chitinized parts of the head, were either a molt skin or less probably what was left of a larva that had died for some unaccountable reason long previously. Although it did not occur to the writer to examine the abdomen of the beetle for evidence of the wound through which the full-grown larva possibly had escaped, yet the evidence, if not complete, was in favor of the theory that the host under normal conditions in the field had recovered after becoming a victim of the parasite.

During the past season further observations to the same effect have been made. In a letter to the writer Mr. Harrison E. Smith cites the case of a beetle of *Coccinella 9-notata* collected at Agawam, Mass., which under his observations fully recovered from the effects of parasitism and lived at least six weeks after the parasite had issued from its body. In a long series of experiments with about twenty different hosts, the writer also found that beetles of *Olla abdominalis* in five out of nine cases observed fully recovered within a few days after the larva of the parasite had made its escape. Such beetles failed to become palsied and wandered away from the cocoon, even before the construction of the latter was fairly under way. One beetle, a female, was noted to be exceptionally active just after the parasite had issued and ran about the vial as if nothing had happened. This female having been mated in the meantime, began to deposit eggs after an interval of twenty-two days.

It occured to the writer that it ought to be possible to rear a second generation of the parasite from these beetles, and the experiment was tried out, consequently, with entire success in two cases. The complete data of one of these experiments are as follows:

August 2nd—♂ *Olla abdominalis*, reared from stock collected at Brownsville, Texas (M. M. High).

August 5th—Beetle exposed to parasite, the fourth generation originally from *Hippodamia convergens*, collected im Humboldt Canyon, California (received from Harry S. Smith).

August 25th—Cocoon of parasite found, the beetle active.

August 30th—♀ *Dinocampus* issued from cocoon.

September 12th—Beetle re-exposed to the parasite that issued from it.

November 4th—Second cocoon found.

November 10th—Beetle found dead. Dissection gave proof of successive parasitism.

November 17th—♀ *Dinocampus* issued from second cocoon.

These observations show conclusively that this particular parasite does not injure the vital organs of the host in the least. In the great majority of cases, however, the fatty lymph tissues of the host are left in such a depleted condition that the beetle soon dies, and the wound through which the parasite escapes in itself probably would be fatal in most instances. It is only the exceptionally vigorous beetles which recover. The observations also illustrate an adaptation of parasite to host rarely seen in such perfection elsewhere. Many of the parasites of homopterous insects do not kill their hosts until the latter in part at least have fulfilled their reproductive functions, but here we find a condition still more favorable to host and parasite alike, in which the host ultimately is left uninjured and free to reproduce its kind.

A NEW GENUS AND SPECIES OF NITIDULINI, WITH DESCRIPTIONS OF OTHER NEW SPECIES OF COLEOPTERA FROM INDIANA AND FLORIDA.

BY W. S. BLATCHLEY, INDIANAPOLIS, INDIANA.

Among the Coleoptera collected during the last two winters in Florida are a number of species which I am not able to identify from the literature extant. As I was making a trip to Cambridge, Philadelphia and Washington last August to study the types of certain Rhynchophora in the LeConte, Horn, and other Collections, I took some of these Florida species with me, and could find nothing similar to several of them in any of the collections. To Dr. E. A. Schwarz, of Washington, D. C., and Chas. W. Leng, of New York City, I am under obligations for aid in making the comparisons and for their opinions regarding the status of the species described below.

March, 1916

Family NITIDULIDÆ.

Quadrifrons, gen. nov.

Labrum small, its front edge broadly rounded, not emarginate. Front projecting abruptly from head, subquadrate, its sides parallel. Last joint of maxillary palpi oblong-cylindrical. Head without antennal grooves. Antennæ reaching middle of thorax, first joint robust, obconical, second oval, one-half length of third, which is slender and clavate; 4—8 short, as wide as long, closely united; club large, subglobose, 3-jointed, the sutures distinct, the two basal joints subequal, strongly transverse, the last joint obtusely conical, smaller but distinct. Eyes small, very prominent, coarsely granulated. Prosternal spine prolonged and convex between the coxæ, then abruptly bent downward; mesosternum not carinate. Front tibiæ with outer apical angle greatly prolonged in the form of a large triangular tooth, the outer sharp edge of the tibiæ behind this projection curved and minutely serrate, the inner apical angle with a short spine. Middle and hind tibiæ each armed at apex with two short, slender spines, their outer angles more or less produced, front tarsi feebly dilated, middle and hind ones slightly broadened; claws simple.

Related to *Perthalycra*, but the front more abrupt, labrum not bilobed, prosternum bent abruptly downward behind the front coxæ and structure of front tibiæ radically different.

Quadrifrons castaneus, sp. nov.

Oblong-oval, convex. Above dark reddish or chestnut-brown, rather thickly clothed with slender, prostrate golden-yellow hairs, those along the margins of thorax, elytra and legs longer and erect, forming a fringe; antennæ, legs and under surface somewhat paler reddish-brown. Head nearly three times as wide as front, finely and sparsely granulate. Thorax convex, more than twice as wide as long, sides broadly rounded, apex feebly and broadly emarginate, base truncate, hind angles rounded; disc minutely alutaceous, finely and sparsely granulate-punctate, each puncture bearing a prostrate yellow hair. Scutellum very large, semi-oval, its apex broadly rounded. Elytra oblong, convex, scarcely as wide as middle of thorax, one-third longer than wide, sides very feebly

curved to apical fifth, then broadly rounded into the subtruncate apex; disc not striate, sculptured and pubescent like the thorax. Pygidium rather widely exposed, finely and sparsely granulate-punctate. Abdomen finely and rather closely punctate. Length 3.2 mm.

Dunedin, Florida, rare; April 5. Taken from beneath a decaying woody fungus.

Family Silphidæ.

Anogdus dissimilis, sp. nov.

Oval, convex, robust. Dark reddish brown, shining, almost glabrous; club of antennæ and a faint cloud on elytra fuscous-brown. Antennæ 10-jointed, the seventh or basal joint of club not much more than half the width of eighth and subequal in width to tenth. Head finely and rather sparsely punctate, the punctures in front tending to coalesce and form minute transverse grooves. Thorax convex, less than twice as wide as long, sides broadly rounded, apex broadly but feebly emarginate, base truncate, hind angles rounded; disc very finely, shallowly and sparsely punctate. Scutellum large, triangular, its apex acute. Elytra oval, convex, scarcely wider than thorax at middle, one-fourth longer than wide conjointly, sides parallel to beyond middle, then broadly curved to the obtusely rounded apex; striæ rather fine, their punctures small, round, very close-set; intervals feebly convex, minutely and rather closely punctate. Under surface finely and sparsely punctate. Length 2.2—2.4 mm.

Dunedin, Fla., scarce; Oct. 31—Nov. 23. Swept from flowers of the hoary lupine, *Lupinus diffusus* Nutt. In *A. capitatus* Lec., the only other described species, the seventh joint of antennae is as wide as the eighth and ninth, the thorax is nearly three times as wide as long, with arcuate base and coarsely punctured disc, and the striæ are crenately punctured. The margins of elytra in *dissimilis* are fringed with very short stiff hairs and the legs, especially the femora, bear numerous coarse, stiff, yellowish ones.

Family Coccinellidæ.

Brachyacantha floridensis, sp. nov.

Narrowly oval, convex. Black, sparsely and finely punctate: head between the eyes, a large spot near each front angle of thorax,

and a humeral, basal and very large postmedian triangular spot on each elytron yellow; antennæ, palpi and legs yellow, the femora slightly clouded with fuscous. Elytra feebly and broadly curved from behind the humeri to apex. Length 2.5 mm.

Ocala, Florida; April 17. Allied to *B. quadripunctata* Melsh., but form distinctly narrower and more elongate-oval, punctures much sparser and colour of elytra and legs very different from that species or any of its varieties. The large yellow spot on each elytron is triangular, with its broad emarginate base extending from the margin near middle four-fifths the distance to suture, its sides gradually converging backwards to an obtusely rounded apex near the tip of each elytron. The elytra, in fact, are as much yellow as black, the black areas comprising a rather broad sutural stripe, a broad cross-bar on basal third, with a medium spur forward between the yellow basal and humeral spots, and a narrow apical bar. The larger yellow spot is narrowly connected along the margin and epipleura with the one on humerus.

Family SCARABÆIDÆ.

Onthophagus nigrescens, sp. nov.

Broadly oval. Above uniform black, strongly shining; beneath reddish brown, antennæ and palpi paler. Clypeus with margin strongly reflexed, elevated and feebly emarginate at middle, surface of clypeus very sparsely and finely punctate. Vertical carina of solete at middle, elevated at each end into a long tapering horn which extends above the level of the thorax. Thorax with front median portion of disc strongly convex and rounded but without a sign of a process; surface finely and rather sparsely punctate, each puncture bearing a very short erect blackish seta. Elytral striæ fine; intervals feebly convex, not alutaceous, each with two or three rows of minute punctures, their setæ extremely short, almost invisible. Pygidium coarsely and rather closely punctate. Under surface finely and very sparsely punctate, the abdomen minutely alutaceous. Length 6 mm.

Dunedin, Florida; Nov. 1. One male from a decaying fleshy fungus. Allied to *O. striatulus* Beauv., but that species is piceous-bronzed, with clypeus subtruncate at middle, setæ of both thorax

and elytra much longer, whitish and inclined, and elytra intervals flat and alutaceous. A study of an extended series leads me to believe that *striatulus* is a distinct species and not a variety of *O. janus* Panz., as placed by Horn and retained in my Coleoptera of Indiana.

Family CHRYSOMELIDÆ

Haltica vaccinia, sp. nov.

Oblong-oval, convex. Uniform dark coppery red, shining, the antennæ, except the basal joint, and the tarsi piceous. Eyes large, coarsely facetted. Thorax three-fourths wider than long, sides broadly rounded, disc very minutely and sparsely punctate, the basal impression narrow, deep, entire. Elytra one-third wider at base than thorax, umbones feebly developed, not limited within by an impression; disc finely, rather closely and evenly punctate, the intervals between the punctures minutely alutaceous. Abdomen finely granulate-punctate. Last ventral of male with a narrow, longitudinal median impression, more distinct near apex; of female with a rounded impression each side near base. Length 3—3.2 mm.

Twenty or more specimens swept from the flowers and foliage of a dwarf huckleberry, *Vaccinium sp.* ? near Dunedin, Florida; March 11 - Dec. 13. Smaller and more slender-bodied than *H. ignita* Ill., the thorax broader, punctuation of elytra denser and more even, umbones less prominent and colour uniform, the under-surface and legs except tarsi being of the same coppery-red hue as the upper surface.

Family RHYNCHITIDÆ.

Rhynchites perplexus, sp. nov.

Oblong, subconvex. Above bluish-black, feebly brassy; antennæ, tibiæ and tarsi piceous; under surface and femora black; pubescence very fine, sparse, prostrate. Beak slightly shorter than thorax, male; one-fourth longer, female; very slightly widened and sculptured with coarse, elongate punctures in front of antennæ; front bluish, strongly alutaceous, finely and sparsely punctate. Thorax subcylindrical, as wide at middle as long, slightly narrowed in front and near base, densely and rather finely punctate, the

punctures more or less confluent. Elytra at base one-half wider than thorax, sides subparallel for four-fifths their length, then broadly rounded to apex; disc feebly but distinctly depressed on basal third; strial punctures coarse, rounded, wider than intervals. Pygidium sculptured like front; side pieces of meso- and metasterna coarsely, rather closely punctate; abdomen finely, very sparsely punctate. Length 1.6—1.8 mm.

Crawford County, Indiana, June 24. Swept from low herbage. Okefinokee Swamp, Georgia, June; Leng collection. Massachusetts; LeConte collection. Easily distinguished from *R. æratus* Say by its colour, shorter beak of male and more feeble elytral depression. Resembles *R. cyanellus* Lec. but smaller, darker, beak much shorter and head much more finely punctured. The eyes of male are round and somewhat larger than the elliptical, more finely facetted ones of female.

Rhynchites elusus, sp. nov.

Oblong-oval. Black, feebly tinged with bronze; antennæ and legs piceous, pubescence gray, very fine and sparse. Beak of both sexes as long as head and thorax, distinctly widened and flattened near tip, much more finely sculptured than in *perplexus*, front bronzed, very finely alutaceous, minutely and very sparsely punctate. Thorax shorter and wider than in *perplexus*, widest at basal third, its disc finely, deeply and very densely punctate, the punctures not confluent. Elytra at base one-half wider than thorax, sides parallel for half their length, then broadly curved to the rounded apex; disc widely and shallowly depressed at basal third; strial punctures small, rounded, close-set. Abdomen alutaceous, finely and sparsely punctate. Length 1.8—2 mm.

Dunedin, Florida, March 25 April 13. Six specimens swept from huckleberry blossoms. The much longer and apically wider beak, more finely sculptured front and broader thorax and elytra separate this readily from both *æratus* and *perplexus*. It is probable that *elusus* and *perplexus* have been hitherto confused in collections with *æratus* Say. The latter is distinctly coppery in hue, with the sub-basal elytral depression much more distinct and the beak in both sexes as long as thorax.

A

B

PLATYPUS WILSONI, N.SP. (See p. 100.)

PLATYPUS WILSONI—A NEW SPECIES OF PLATYPUS FROM BRITISH COLUMBIA (PLATYPODIDÆ, COLEOPTERA) *

BY J. M. SWAINE,
In charge of Forest Insect Investigations, Entomological Branch, Ottawa.

The species of Platypus described herewith is very abundant and injurious on the southern half of the British Columbia coast. Although mentioned in literature and not unknown to collectors, it apparently has never been described. Its habits are those of a true ambrosia-beetle; the adults excavate a cylindrical tunnel from about six to fourteen inches in length through the bark and directly into the wood of large and small trunks, in small trunks usually curving around the heart. A characteristic fungus always found coating the walls, which are stained black thereby, serves as food for the larvæ, and to a lesser degree for the adults. Eggs, larvæ and adults are found free in the tunnels. The boring dust, ejected in abundance from the tunnel entrance and lodged in heaps in the bark crevices, is in the form of minute white splinters (Pl. VII, Fig. 1). It is readily distinguished from the meal-like boring-dust of *Gnathotrichus* frequently found in the same trunks.

It attacks all conifers of the British Columbia Coast, with the exception of *Thuya* and *Chamæcyparis*, but is most abundant in *Pseudotsuga*, *Tsuga*, and *Abies grandis*. The species is abundant on the coast as far north as Seymour Narrows and inland in the south to Agassiz.

Dying or badly weakened trees and freshly cut logs are usually selected for attack, but standing trees with considerable green foliage are not infrequently affected. A tree showing the piles of boring-dust of this species and of *Gnathotrichus* is invariably beyond hope of recovery. These piles of boring-dust are frequently seen on the blackened bases of trees injured by ground fire; in such cases the beetles enter through the fresh tissue exposed by cracks in the drying outer bark. The details of the life-history will be given elsewhere. The specific name is given in honour of our colleague, Mr. Tom Wilson, of Vancouver, B. C., who first collected the species in British Columbia.

*Contribution from the Entomological Branch, Department of Agriculture, Ottawa.
March, 1916

Platypus wilsoni n. sp. The female type: Length, 5.5 mm.; width, 1.3 mm., shining, with the pubescence inconspicuous above, except on the front and about the declivity.

The head has the whole front broadly and deeply excavated, densely granulate-punctate and clothed with long yellow hairs; the vertex coarsely punctured, the punctures shallow and elongate, and with a narrow, shining, median carina; the epistomal margin nearly straight, very broadly concave, with a small, inferior median lobe clothed above with orange setæ. The antennal scape is stout, longer than the funicle, the pedicel subglobular, as long as the remaining three segments, the club densely pubescent and with sparsely scattered stouter bristles.

The pronotum is one-fifth longer than wide; the cephalic margin broadly evenly arcuate and finely margined; the sides subparallel, with a broad and deep emargination just behind the middle; the hind angles rounded; the caudal margin transversely bisinuate with the median prolongation rather small and acute; the disc irregularly depressed about the median line, with a median sub-oval area on the caudal half very finely and densely punctate, this densely punctured area divided on the middle line by a fine, black, slightly impressed line, and with the strongly convex caudal margin extending nearly to the caudal margin of the pronotum; the remainder of the pronotum finely punctured, more sparsely in front, more closely on the sides and behind, with coarser setose punctures close to the cephalic margin; the pubescence elsewhere minute and inconspicuous.

The scutellum is strongly depressed, very elongate and very sharply acuminate.

The elytra are elongate, slightly more than twice as long as wide, about as wide as the pronotum; with the sides parallel, slightly inflated behind the middle, gradually arcuately narrowed on the caudal fifth to the subtruncate apex; the disc gradually depressed behind on the apical fourth to the very short, nearly perpendicular declivity; the striæ distinctly impressed, but disappearing near the apical declivity; the strial punctures close, rather faintly impressed, individually narrow and elongate; the interspaces convex, smooth, similar, almost unipunctate on the basal two-thirds, on the apical third with nearly uniseriate, granu-

late and setose punctures with small punctures intermixed, the granules coarser and acute on the sides; the third interspace strongly widened at the base, swollen and densely, finely granulate; the short abrupt declivity with a rounded prominence on each side above, finely, closely granulate and setose-punctate, without striations, moderately concave apically, with the caudal margin subtruncate, bisinuate, and the lateral angles rather strongly dentate.

The metasternum is smooth and shining, finely punctured, the pubescence slender, the median line deeply striate on the caudal two-thirds; the abdominal sternites are closely, finely, granulate-punctate and clothed with slender hairs, the last more densely granulate; the last three sternites with the cephalic and caudal margins somewhat elevated, the last sternite rather distinctly concave therefrom.

The *male* has the epistomal margin more deeply though very broadly emarginate dorsally with the inferior lobe more prominent; the front similar though less deeply concave and with somewhat shorter hairs; the pronotum similar, lacking the densely punctured median area, but with a median black line in the same position and very distinct; the elytra with the sides parallel for three-fourths the length then strongly arcuately narrowed to the individually strongly produced apices, the lateral margin concave at the base of the prolongation; the apical prolongations each slightly longer than wide, emarginate at the apex, with the outer angle much longer than the inner, blunt and obtusely carinate above from a continuation of the united 2nd and 3rd interspaces, the carina ending in a third blunt point on the dorsal apical margin of the prolongation; with a smaller tooth between the dorsal and outer teeth and three serrations between the dorsal and inner teeth; the suture, viewed from the side, straight on the basal two-thirds, and gradually depressed on the caudal third to the apices, without an abrupt declivity; the strial punctures notably coarser than in the female; the interspaces somewhat more convex; the second less strongly widened at the base and more finely granulate; the interspaces minutely, uniseriately punctured on the disc, but not striate; the punctures coarser, more numerous and finely granulate at the base of the 1st and 3rd; on the depressed caudal third all the inter-

spaces more strongly but similarly convex, except the 8th, carinate and closely, uniseriately, coarsely granulate, with stout reddish, uniseriate hairs; the 2nd and 3rd united at the base of the apical prolongation to form its dorsal carina, the 8th more strongly carinate on the apical third, the 9th granulate throughout its length, sparsely and more feebly on the middle third, rather coarsely and irregularly at the base.

The metasternum has the middle line sulcate on the caudal half; the abdominal sternites are closely, moderately granulate-punctate, more coarsely than the metasternum and more coarsely than in the female, and with distinctly longer hairs.

The type, a female, is from *Tsuga heterophylla*, taken at Campbell River, B. C. It is in the collection of the Entomological Branch, Department of Agriculture, Ottawa.

PLATE VI.

A. *Platypus wilsoni*, ♀. Greatly enlarged. Slightly modified from Entomological Bulletin No. 7, Dept. of Agriculture, Canada.

B. *Platypus wilsoni*, ♂. Apices of the elytra. Greatly enlarged.—(Original).

PLATE VII.

1, Boring dust of *Platypus wilsoni;* 2, Maxilla; 3, Labium; 4, Maxillary Palp, greatly enlarged; 5, Antenna. All enlarged. (Original).

DESCRIPTION OF ELEVEN NEW SPECIES OF CHALCID FLIES.

BY A. A. GIRAULT, WASHINGTON, D. C.

Neomphaloidella ceroplastæ, n. sp.

Female—Length 1.00 mm.

Differs from *Tetrastichus periplanetæ* Crawford in being darker, the scape is partly metallic, there is no lateral carina on the propodeum, the latter is not distinctly scaly, there are punctures along the lateral margin of the scutum.

Greenish black, the wings hyaline, the venation pale yellow, the knees, tibiæ and tarsi (except the last joint) distal half of scape and the pedicel, except the proximal half above, golden yellow. Funicle joints subequal, each nearly twice longer than wide, slightly longer than the pedicel; club 1 as long as funicle

PLATYPUS WILSONI, N.SP. (See p. 100.)

3, half the length of the club, the third joint with a convex base and a distinct terminal nipple. Scape a little compressed. Mandibles tridentate, the second two teeth weakly separated, the third truncate, but not large. A line of delicate punctures across the pronotum. Stigmal vein of moderate length.

The male is about the same, but the propodeum and flagellum not seen.

Described from one male and seven females reared from *Ceroplastes galeatus* Newstead, Kampala, Uganda, Africa (C. C. Gowdey).

Types—Catalogue *No. 19914*, U.S.N.M., three females on tags, one male and two females head on a slide.

Neomphaloidella pulchriventris, n. sp.

Female—Length 1.20 mm.

Dark metallic purple, the wings hyaline, the legs, antennæ and abdomen lemon yellow, with the following exceptions: Distal joint of club (washed with purple), proximo-dorsal half of pedicel, bases of coxæ, middle femora (except ends), a cinctus just below middle knee, lateral margin of abdomen, the acute distal fifth (or somewhat more) of the abdomen and two faint cross-stripes on abdomen (both interrupted along the meson) between the centre and the distal purple. The marginal stripe of abdomen is broken or partly so just where it joins the distal purple and there is a marginal dot at middle of the abdomen. Second two ring-joints very short. Funicle 1 nearly thrice longer than wide, a little longer than 3, which is longer than any club joint or the pedicel. Club with a distinct nipple. Mandibles tridentate. Venation yellow, the stigmal vein long. Fore wings broad. Propodeum with delicate median and lateral carinæ, the former flat. Abdomen conic-ovate. Sculpture usual.

Described from one female captured by sweeping in the open forest, October 10, 1915, at Glenndale, Prince George County, Maryland.

Type—Catalogue *No. 19915*, U.S.N.M., the above specimen on a tag, the head on a slide.

A second female, same place, October 24, 1915.

Gonatocerus partifuscipennis, n. sp.

Female—Length 0.85 mm.

Black, opaque, the first two pairs of knees and the four proximal tarsal joints, reddish brown; fore wings with the distal third distinctly infuscated, the venation dark. Thorax scaly, the parapsidal furrows shallow, the scutellum simple, the propodeum with a very widely separated pair of median carinæ. Fore tibiæ with about five small teeth dorsad, the last near apex. Funicles 1-4 subequal, each a half longer than wide, shorter than the pedicel, narrower than the others; 5 and 7 longest, each twice longer than wide; 6 and 8 subequal, somewhat longer than 4. Scape compressed. Marginal fringes of the fore wing not long, about a fifth of the greatest wing width, the discal cilia very fine. Strigil present. Caudal wings acuminate, bearing a pair of discal cilia along the caudal margin and about three long lines cephalo-distad, the caudal marginal cilia longer than the marginal cilia of the fore wing. Caudal tibial spur single.

Described from one female captured by sweeping in open forest, Glenndale, Maryland, October 11, 1915.

Type—Catalogue *No. 19916*, U.S.N.M., the above specimen on a slide.

Phænodiscus partifuscipennis, n. sp.

Head lenticular, the distinct scrobes short, weakly joined above. Marginal vein thrice longer than wide, subequal to the postmarginal, the curved stigmal longer. Similar to *æneus* Dalman (compared with German specimens in the U.S.N.M.), but the fore wing, though similarly infuscated, bears also a very large hyaline space between near base (where the wing is longitudinally infuscated caudad) and two-thirds the way out to the hairless line; otherwise as in *æneus*. Scutum punctate, the punctures sparser on the scutellum.

The male has the wings hyaline, the antennæ yellowish, the scape and pedicel dorsad purplish; funicle 1 five times longer than wide, longest. Pedicel short, club not seen, otherwise like the female except tips of tibiæ (most of first tibiæ) yellowish. The mandibles in both species are obtusely, equally tridentate.

From one male, two females labelled "Italy, State Insectary, California. Ex. *Saissetia hemisphærica*."

Types—Catalogue *No. 19917*, U.S.N.M., a pair on tags and

a slide bearing the male and female heads and wings and the same of female *æneus*.

Sympiesomorphelleus trisulcus, n. sp.

Female—Length 2.50 mm.

Agrees with the description of *Diglyphus maculipennis* Ashmead, but purplish, the scutellum is very slightly rippled and has the median groove only along proximal two-thirds, the infuscation of the fore wing is lighter and more suffused, the flagellum is light yellowish, while the legs and scape are white. Head with scattered pin-punctures. Abdomen honey yellow, except most of segment 2 of the abdomen dorsad, which is washed more or less deeply with purple and occupies about a third or more of the surface. Propodeum tricarinate and with a distinct cross-carina about the middle. Mandibles about 10-dentate. Funicle 1 nearly thrice longer than wide, 4 somewhat longer than wide, longer than the pedicel. Club 2 only about half the length of 1.

Described from one female, minutien-mounted, in the U.S.N.M. labelled "*Diglyphus albipes* Ashmead. Male type, 1500 feet, St. Vincent, West Indies, H. S. Smith."

Type—Catalogue *No. 19918*, U.S.N.M., the above specimen plus a slide bearing the head and a hind tibia.

Neomphaloidella nebraskensis, n. sp

Female—Length 1.50 mm.

Black-brown, the wings hyaline, the venation white, the first two pairs of tibiæ, the tarsi, the knees broadly and tip of caudal tibiæ yellowish white. Postscutellum, lateral margins of scutum very narrowly and the mesopleuracic sutures yellowish. Propodeum with a narrow median carina, no lateral carina. Punctures along lateral margin of scutum very obscure. Of the usual fine sculpture. Funicle 1 two and a half times longer than wide, 2 and 3 each nearly twice longer than wide; club with a terminal nipple, its first joint slightly shorter than funicle 3. Pedicel elongate, a little longer than funicle 3. Mandibles tridentate.

Described from one female on a tag in the U.S.N.M., labelled "Lincoln, Neb., Webster, No. 2142. G. I. Reeves."

Type—Catalogue *No. 19919*, U.S.N.M., the above specimen plus a slide with the head.

(To be continued.)

REPORT OF THE DOMINION ENTOMOLOGIST.

In the Report of the Dominion Entomologist for the year ending March 31st, 1914, which has just been published, an account is given of the activities of the Entomological Branch of the Dominion Department of Agriculture, in the matter of controlling insect pests throughout Canada, and all who are interested in this subject will be repaid by a perusal of this record of a year's work. The Department now maintains nine field laboratories in different parts of the Dominion, at which investigations on various insect pests are carried on. This line of work constitutes the chief aspect of the work of the Branch. A large amount of work is necessitated by the administration of the Insect and Pests Regulations of the Destructive Insect and Pest Act, involving the inspection and fumigation of trees and plants entering Canada. Perhaps one of the most interesting of the activities of the Branch is the work carried on against the Brown-tail Moth in Eastern Canada, particularly the importation and establishment of the parasites of this insect and the Gipsy Moth. A map is given, showing the places in Canada where the parasites of the Brown-tail and Gipsy Moths have been distributed by the Department. Other branches of work covered by the Report are investigations on insects affecting cereals and other field crops, including an account of the notorious Army-worm outbreak of 1913; insects affecting fruit crops, as the result of which investigation work of great practical value has ensued; insects affecting forest and shade trees in which an account of the investigations of Stanley Park, Vancouver, which has been so seriously affected by forest insects is given; insects affecting domestic animals and man, and insects affecting garden and greenhouse. The Report is a record of marked progress in a branch of the work of the Department of Agriculture which not only affects agriculture, but also forestry and public Health. Copies of this Report may be had free on application to the Publications Branch, Department of Agriculture, Ottawa, and requests for the Report may be mailed free.—[Press notice from the Ottawa Department of Agriculture.

NOTES AND QUERIES.

NOTES ON HIBERNATING LADYBIRD BEETLES.

With the exception of frequent specimens of ladybird beetles passing the winter in houses, the writer has only occasionally found hibernating forms. In consequence of this, the discovery of a large number of the species *Adalia bipunctata* Linn., in their winter quarters, has proven more than usually interesting. The

removal of a sheet of bark, from a dead White Pine, disclosed over a hundred beetles of this species. They were congregated in several groups that averaged approximately a dozen specimens. The debris produced by the boring of bark beetles furnished the material among which they had found shelter. As less than a couple of square feet of the tree was stripped, there is no doubt that many more were hibernating beneath the bark on the remainder of the tree.

It is safe to assume that several factors were operative in in causing the collecting, at one place, of such a large number of beetles of the same species. Either the situation chosen by them may have presented ideal conditions for hibernation and thus proved attractive to many specimens, or this species may be gregarious in its winter habits. Also the proximity of High Park would ensure, in the neighborhood, a luxuriant growth of various plants furnishing suitable feeding grounds for aphids during the summer, a circumstance that would react favourably on the production of the ladybirds.

On November 20th, the date upon which the observation was made, the beetles had not become entirely dormant, but, when disturbed, showed slight signs of activity.

A. Cosens, Toronto, Ont.

Hepialus thule at rest.—I had occasion, last July, to keep a ♂ *H. thule* alive for a couple of days, and noticed that, in clinging to the sides of the box or to branches, the first two pairs of legs only are used. The hind pair, which bear the great tufts of scent distributing hairs, are drawn up alongside of the body. This is shown in the reduced sized photo of the moth accompanying Mr. Swaine's article in Can. Ent. XLI, 337-343, pl. 10, fig. M (1909), but the position is always head up.

I do not recollect seeing any reference in our literature to this habit. A. F. Winn, Westmount, Que.

A New Enemy of Poplars and Willows in New Jersey.—During the past few summers, a small greenish-blue Chrysomelid was observed feeding in considerable numbers on poplars and willows chiefly in nurseries at Arlington, Elizabeth, Irvington, and several other northern New Jersey points. Very little attention was paid to it, inasmuch as it was assumed to be a native species. It turned out,

however, to be *Plagiodera versicolora* Laicharting, which is an old name for the common *P. armoriceæ* of Europe. From its activity in New Jersey, it can easily do considerable damage, feeding as it does, in both larval and adult stages, but, of course, can undoubtedly be kept in check by arsenical sprays.

HARRY B. WEISS, New Brunswick, N. J.

Bat Fleas.—The Hon. N. Charles Rothschild has very kindly sent me word that the bat-fleas of which I gave an account in the Annual Report of the Ent. Soc. of Ont. for 1909, belong to the species: "*Ischnopsyllus insignis* Rothschild. Nov. Zool., Vol. X, p. 319, No. 4, pl. IX, figs. 8-12, 1903."

I am much pleased to receive this authoritative identification of the insects. THOMAS W. FYLES.

Ottawa, January 27th, 1916.

Apropos of the late Prof. Webster's note in the Can. Entom.' Vol. XLVII, p. 406, I can report an assembling of *Anosia plexippus*' which seemed to me remarkable on account of both the earliness of the date and the situation.

In connection with an investigation of the introduction of the San José Scale into Ontario, I called on the 16th day of August, 1899, upon a farmer who, the neighbours said, was the first man to observe it in the Niagara district. His farm was on the Lake Ontario shore (south side) a few miles west of the mouth of the Niagara River. A grove across his property cut off the view of the lake. In conversation, he mentioned the fact that this grove was then swarming with red butterflies. I went back through it and found that he had not exaggerated, for, verily, there was a multitude of "monarchs" there "that no man could number."

London, Ont., Dec. 12, 1915. JOHN DEARNESS.

NELSON'S "EMBRYOLOGY OF THE HONEY BEE"

THE EMBRYOLOGY OF THE HONEY BEE. By J. A. Nelson, Ph.D. 282, pp., 95 + XV. figures. Princeton University Press. Price $2 net. 1915.

In the short preface that he has written for this book, Dr. E. F. Phillips explains that in it "is presented to the beekeeping public, as well as to those whose interests are more scientific, the

most thorough account of the complex development of the bee egg yet published, and to those interested in bees no apology for investigations of this kind is needed. It is of interest to the bee enthusiast, for, while possibly he may not fully appreciate all the details discussed, he will assuredly want to take such facts as his training permits." With all of which we most heartily agree. As a class, beekeepers are the greatest of enthusiasts, but it was well that Dr Phillips exercised his usual caution and used the qualification "as his training permits," for we can imagine the untrained bee enthusiast in a commendable endeavour trying to master the terminology of the cytologist and embryologist, to unravel the description of mitotic phenomena and to decide for himself, for there is no room for indecision in beekeeping, as to the origin of the mesenteron. With a profound conviction of the marvellous nature of the processes that go on during those seventy-six hours required for the development of the egg, a deep admiration for the author who has so skilfully studied and described those changes and pride in the possession of such a work, he will lay it down and slip away to his apiary to see whether any of his colonies need requeening.

Dr. Nelson's monograph constitutes a very valuable contribution to our knowledge of insect embryology, a branch of our science which has received all too little attention on this continent. It is a useful work mainly for two reasons. First, the author has investigated, with the aid of improved technique and modern methods of research, a problem previously studied in considerable detail by such workers as Bütschli (1870), Kowalevski (1871), and Grassi (1884), upon whose results we have necessarily had to rely for our knowlede of the embryology of this insect. Secondly, the author has not confined himself to a description of the results of his own careful work, but he has brought together in a desirable form the main results of other workers on insect embryology upon which subject, accordingly, the volume constitutes almost a complete review, and on that account will be of great value to students and others desiring such information.

The author describes in sequence the embryological changes: Cleavage, formation and completion of the blastoderm, the formation of the germ layers, and the amnion. After a general account

of the development of the embryo the development of the various organs is described: The nervous and tracheal systems, the oenocytes, muscles, fat-body, circulatory and genital systems and alimentary canal. A useful summary is given at the end of the book; in this connection we think the value of the book would have been enhanced by the inclusion of a summary at the conclusion of each chapter.

On the whole, Dr. Nelson confirms the observations of the previous investigators who have studied the development of the bee egg, and his work does not afford any striking differences or discoveries. The account of the cleavage of the egg agrees in the essential details with the earlier work. In regard to the vexed question of the origin of the mesenteron, the importance of which has always been emphasised on account of its bearing of the broad theory of the germ layers, the results of this study are held to lend little support to the views of those who regard the mesenteron of insects as arising from the ectoderm of the stomodæum or proctodæum, and to harmonize still less with the theory of the origin of the mesenteron from cells remaining in the yolk. The author considers a final decision between these two rival interpretations premature. Certainly the honey bee is too highly a specialized member of a specialized order upon which to base generalizations. It is found that the anterior and posterior mesenteron rudiments are formed from the blastoderm of the ventral plate by an inward movement of its cells. The book is characterized by a desire on the part of the author to review the conclusions of previous investigators of the embryology of the honey bee and of other insects, to present the results of his own study and to leave the detailed discussions of rival interpretations to those who prefer the atmosphere of debate, and in a work of this character and purpose we think such an attitude is perhaps desirable.

The numerous excellent illustrations, on which the author is to be heartily congratulated, increase the value of a book which will be very useful to students of insect embryology, and to those beekeepers who may be qualified by their training or mental courage to appreciate what is undoubtedly the best account we have of the development of the egg of the honey bee.

C. Gordon Hewitt.

Mailed March 14, 1916.

The Canadian Entomologist.

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POPULAR AND PRACTICAL ENTOMOLOGY.

The Five Thousand Dollar Butterfly.

BY R. P. DOW, BROOKLYN, N. Y.

Somewhat over eight centuries have elapsed since the men of Europe woke from the slumber of the Dark Ages and began to value mental culture. Men of classic times do not appear to have been "collectors" except of art works. In the Renaissance there was a turn to Natural History, possibly inspired by the Moors, who taught even Entomology in their universities. Too many of the new collectors looked for unicorns, nine-headed hydras, and the like, but there was nothing more popular than a display of butterflies. The first collection of the "Frail Children of the Air" which is now known was made by an Italian toward the end of the Eleventh Century. From that time the number of Entomologists increased amazingly, although not until about A.D. 1600 was any truly scientific work done. However, it is much the same to-day. There is a goodly representation in every Entomological Society of students, of close observers, even of patient taxonomists, but the majority are still mere collectors, desiring nothing more from their fellows than the scientific names of their specimens and using no more mental acumen than is necessary to get together postage stamps or tin tobacco tags.

If a man will collect, spread and value butterflies in his cabinet, it also follows that he will buy them. He wishes for two elements, beauty and rarity. Thus the professional collector came into existence. He found business most lucrative furthest afield, in the most inaccessible corners of the earth, but he found much, too, at home. For at least a century there has existed a widespread belief that somewhere, anywhere, perhaps in one's own backyard, anyone might find a rare butterfly, so rare that some collector somewhere would gladly pay $5,000 for the prize. It has passed orally through many lands, occasionallly getting into print, but

not often, for publicity and superstition are not compatible companions. To-day in this country there are thousands of people who, if they spy a butterfly unfamiliar to them, hasten to learn if it be not the precious prize. Scarcely a year ago a newspaper printed an account of a butterfly caught near New York which was unique and for which $3,000 was paid at once by the nearest Museum. Such items and such inquirers have become the bane of every Museum Curator's existence. Such hordes of *Pieris rapæ* or *Anosia plexippus* come in the mails, each inquiry demanding an answer! A little less than twenty years ago a prominent newspaper was guilty of printing a more startling variant of the myth. It was to the effect that the United States National Museum had just paid $20,000 for an American butterfly. An employee was forced to devote several months of his entire working days to writing denials and pacifying visitors who came with specimens worth less than a penny for which they hoped to get thousands.

A similar myth which has got into print scores of times is that of the arctic flea. It differs much in detail. The price that it would fetch (a pair being wanted) was sometimes as low as $1,000, but it was more often up to the traditional $5,000. It was invariably wanted by the Hon. Mr. Rothschild. Some said the creature inhabitated the fur of the arctic fox. Others cited the sea otter and called it the more elusive, as at the moment the animal was killed the parasite left the body. It is said that Mr. Rothschild has sent expeditions at the cost of tens of thousands to hunt arctic mammals until the identity of the desired flea should be forever established and the types deposited in the Tring Museum.

It is quite possible that some good-natured student of fleas would give five dollars for some new arctic species.

All this suggests two lines of inquiry: Has $5,000 ever been paid for a single entomological specimen; if not, how much has? On the other hand, is it possible for any one in North America, excepting less than a dozen trained experts, to make even a moderate living by collecting insect rarities? Any dealer in insects might be inclined through self-interest to exaggerate the first, since he has rarities to sell, and to under-estimate the other, since he is constantly importuned to buy.

No doubt, big prices have been paid, especially long ago when travel was not so easy as it is now. A very interesting tale is that of the first collector who landed in the Solomon Islands and lived six weeks in the tree tops to avoid the head hunters. We hope his grist fetched a big price and that for his glorious new green and gold *Ornithoptera* a sum in four figures was given. We know that the first *Drurya antimachus* (or perhaps it was not even the type) was bought by a Scotchman for $1,500, but we do not know how much of this went to the explorer who braved the malarial jungle. For a Brooklyn collection $2,000 was once paid, there being little of value except the singleton *Actias Jehovah*, eccentrically named by Strecker. An aberrant *Papilio* was once sought from Mr. Neumogen by a Russian Prince for $1,000, but its like can now be bought from a dealer for $25. Girdling the world is making it smaller. Mr. Say received $300 for his *Amblychila cylindriformis* It was thirty years before a second specimen was unearthed. That fetched $50. To-day fifty cents is a fair price. Not many years ago a collector in New Jersey had in his boxes two aberrants of common *Papilio*. A dealer gave him $25 for both and resold them for about $300 each. The first three specimens of *Sphinx frankii*, caught not so many years ago, averaged nearly $300 apiece. Such instances can be multiplied many times.

As for making a living by collecting, a few exceptions prove the rule of its futility. An enterprising young woman in the far west, taught by her father, a veteran collector, caught both place and psychological moment. She sold her season's catch from an untraveled mountain pass for a price which sent her through college. But how many others could get a tenth as much? Could any half-trained collector get a cent a piece for a season's catch, unless from some very remote place? A collector well trained in beetle study, whose home territory is in the mountains seldom traveled, writes to me that with constant labour he can hardly average $5 a week.

A favorite way of collecting is to get "grubstaked." Some naturalist wants to visit some rare locality and collects funds from his friends, each contributor to take pay in "results," one taking beetles, another Orthoptera, etc. Of a score of such trips

taken or planned during the last five years I do not recall one that was successful. During three years of editorship I have received probably a thousand letters of which a sample is: "I have sixteen *cecropia* cocoons, two *Luna*, three *Promethea*, and one *Polyphemus*. What can I get for them?" What can one reply when he gives away each year several bushels of them for school study?

Even the practice of "exchanging" seems to be in decay. One reason for this is, no doubt, due to the lack of idea of fairness in giving value for value. Another is that the Lepidoptera have been so well distributed that there is little left to exchange. A while ago a selection of four hundred names was taken from the Naturalists' Directory, all marked as desiring to exchange in some province. All these were written to. A dozen replies were received, mostly to say that no more interest was taken. Not one was inclined to start exchanges on any basis whatever. In a Pacific Coast city, where Natural History has lately received a great impetus, there are sixty lads frequenting a newly established Museum, who have written broadcast, wanting to give their local butterflies in exchange for those of any other part of North America, I doubt if between them all they have received ten letters of encouragement.

Is there no pleasant side to the story? Do not some make money? Yes, many. A farmer in California allows the Dutchman's Pipe to grow in some of his fence corners. He takes enough chrysalids of *Papilio philenor* to pay the annual taxes on the whole farm. An assistant janitor of a big building in Brooklyn loves his Sunday afternoon walk in the country. One day he gathered 50,000 hibernating squashbugs (*Anasa tristis*) and sold them. He cleared $90 in twenty walks and had lots of fun besides. One day a party of us were on Rockaway Beach when *Anosia plexippus* was swarming on the way south. They were numb with cold and easy to pick as blackberries. A day's work would have included less than, say, 20,000 of them, and they found a ready market at a cent and a half. Not a bad day for some of our collectors, whose pay envelope contains perhaps $12 per week. A Newark collector has walked under the electric lights every warm evening for many years. He has thus aided his health,

got many rare moths, many tropical Sphingids for his own collection, and half a dozen times a year he can fill a six-quart pail with *Tropisternus triangularis* or *Benacus griseus* to go to some college for biological class room work at, perhaps, $20 a pailful. This seems worth while.

There is something even more worth while. Love of the great "all out-doors" is its own reward. The world needs more Fabres, more Thoreaus, to transmit knowledge gained by keen and constant observation. For every hundred present casual observers there should be a hundred thousand. The things to see, to ponder over, are infinite. No Sunday afternoon "movie" show has a fraction of the interest of ten square yards of vacant city lot. There is no neglected, tangled corner in swamp or fallow field that does not teem with life, that does not afford far more profit to him who seeks patiently than the fabled Five Thousand Dollar Butterfly.

DESCRIPTION OF ELEVEN NEW SPECIES OF CHALCID FLIES.

BY A. A. GIRAULT, GLENNDALE, MD.

(Continued from page 103.)

Thymus, new genus of Tetrastichini.

Genotype—*Encyrtus albocinctus* Ashmead.

Encyrtus chionaspidis Howard.

Genotype of *Adelencyrtus* Ashmead. Frons subprominent, moderate in width. Mandibles tridentate, the third tooth truncate, yet with a concave apex. Marginal vein thrice longer than wide, the postmarginal and stigmal veins subequal, each about two-thirds the length of the marginal. Funicle 6 a little wider than long, 1 twice wider than long. Antennæ pale yellow, the pedicel above and distal club joint dusky. Fore wings very finely ciliate. Face much inflexed. Thorax dorsad flattened. Cheeks as long as the eyes. Runs very close to *Epiencyrtoides* Girault. The coxæ are white. The caudal femur and the flagellum are concolorous Scutellum with somewhat rougher sculpture than the scutum. Axillæ very narrow, not quite meeting. Small. From the types in the U.S.N.M.

Baoanusia africana, n. sp.

Female—Length 1.35 mm.

Differs from the description of the genotype as follows: The club is only somewhat longer than the funicle; funicles 5 and 6 are white; the dorsal apex of the second tooth of the mandibles is tooth-like, appearing nearly as a small intermediate tooth; the marginal vein is only about twice longer than wide, subequal to the post-marginal, the stigmal somewhat shorter; only the tips of the tibiæ, the tarsi (except last joint) and a band on caudal tibia just below the knee, are yellowish white (a broader band at base of middle tibiæ); otherwise about the same. Scutellum with velvety appearance. Hairless line of fore wing with only about 4-5 loose lines of cilia proximad of it. Club obliquely truncate from the base of joint 3. Funicle 6 a little longer than 1, much wider.

The male has the knees somewhat pale, the frons distinctly broader, the facial inflexion less, the antennæ inserted higher and with a long ridge-like carina between them. The antennæ (except the pedicel) are reddish brown, the joints of the funicle excised and bearing two whorls of long hairs, 3 and 4 longest, over twice longer than wide, 1 about a half longer than wide, 6 a little shorter. Scape short and stout. Club solid, distinctly longer than the body of the scape, over thrice longer than wide.

Described from two males, four females in the U.S.N.M., labelled "Parasite of *Lecanium oleæ*, Cape Colony, South Africa. C. P. Lounsbury."

Types—Catalogue *No. 19920*, U.S.N.M., the above specimens on a tag.

Catolaccus perdubius, n. sp.

Female—Length usual.

Differs from *nigroæneus* Ashmead, which is the same in the female as *cæliodis* Ashmead in that the tibiæ in both sexes are deep metallic blue-black (in the other species only lightly embrowned, more so at base), and the male is like the male of *incertus*. Differs from *incertus* Ashmead in that the funicle joints are all short, 6 only slightly shorter than 1, subquadrate, 1 slightly longer than wide, shorter than the moderate pedicel.

Described from a large number of each sex reared in connection with the strawberry weevil, St. Paul, Minnesota (S. Marcovitch).

Compared with types of the named species.

Types—Catalogue *No. 19921*, U.S N.M., two males, four females on two tags, a female head and hind leg on a slide.

Hyssopus, n. gen. of Ophelinini.

Female—Agrees with the description of *Dichatomus* Foerster, but the scutellum bears the lateral grooves which join around the apex, and there is but one very short ring-joint (but the base of funicle 1 is rimmed like a second one). Club without a terminal nipple, distinctly 2-jointed. Propodeum with a distinct median carina and a lateral carina, which runs directly from the spiracle. Mandibles 7-dentate, 6 and 7 small, feebly divided. The large, quadrate pronotum longer than the scutum. Abdomen subsessile, flattened, a little longer than the thorax. Cephalic tibia without a strigil, the spur short and straight. Marginal vein subequal to the submarginal, the stigmal slender, about a third of the length of the marginal, shorter than the postmarginal.

Hyssopus thymus, n. sp. (Genotype).

Female—Length 0.85 mm.

Very dark, nearly black, the wings hyaline, the thorax scaly, the propodeum glabrous, the trochanters, tips of tibiæ broadly, and the tarsi yellow, the venation dusky yellow. Pedicel a half longer than wide, a half longer than funicle 1, which is a little longer than wide and longest, 2 and 3 wider than long (2 a little the shortest) 4 a little wider than long, larger than 3. Club ovate, wider than the funicle, its first joint largest. Marginal fringes of the fore wing a little longer than usual. Propodeum latero-dorsad distinctly pubescent. Tarsal joints not long.

Described from one female on a tag in the U.S N.M., labeled "Lincoln, Nebraska, Webster No. 2142. G. I. Reeves."

Type—Catalogue *No. 19922*, U.S.N.M., the above specimen plus a slide bearing a fore and hind leg, the head and a fore wing.

Diglyphus maculipennis Ashmead. (Genotype of **Diglyphomorpha** Ashmead.)

Caudal tibial spur single (?), distinct. Mandibles 9-dentate. Antennæ 8-jointed, without ring-joint, the club 2-jointed ending conically, not distinctly nippled. Parapsidal furrows complete, delicate. Axillæ not advanced. Lateral grooves of scutellum nearly joined around the apex. Propodeum with a distinct median

carina, long, with a lateral obtuse sulcus, and between these, delicate (a few) curved rugæ; spiracles minute. Antennæ inserted a little below the middle of the face. Axillæ and scutellum polished. Head with scattered punctures. Abdomen glabrous, yellowish mesad along basal third or more (dorsal), Club 1 longest. Funicle 1 longest, about twice longer than wide, 4 barely longer than wide, larger than the small pedicel. Blotch on fore wing terminates distad at the apex of the stigmal vein and extends proximad along under most of the marginal. Postmarginal vein a third shorter than the stigmal, in a wing of one specimen; as described in the other. Original description otherwise about correct. From two female types in the U.S.N.M. (a slide bearing a head, wings and a hind tibia).

D. albipes Ashmead, male, is a *Sympiesomorphelleus*, and bears *two* caudal tibial spurs. Its colour description is correct, but the specimen is a female and is described above.

Pirene marylandica, n. sp.

Female—Length 0.80 mm., excluding the ovipositor, which is extruded for a third of the abdomen's length. Æneous black, the wings hyaline, the tips of tibiæ and proximal four tarsal joints yellowish white; tip of scape distinctly and funicles 1-3 silvery white. Postmarginal and stigmal veins subequal, short, the marginal slender yet somewhat shorter than the submarginal. Scape obclavate; pedicel distinctly longer than wide at apex, longer than funicle 5, which is largest, large but somewhat wider than long; funicles 1-3 like ring-joints (in the Pteromalidæ), no transverse-linear ring-joint present), 1-2 subequal, 3 larger, a third the length of 4, which is about half the size of 5. Club large, ovate, with a small terminal nipple, as long as the funicle. Flagellum with scattered minute hairs. Form as in *Parecrizotes* Girault. Body finely scaly, the propodeum smooth, noncarinate. Legs not stout, the caudal femur a little compressed. Parapsidal furrows complete. Mandibles spreading, 4-dentate. Maxillary palpi 2-jointed apparently, the distal joint long.

Described from two females captured by sweeping meadows, September 30, 1915, at Hillmead (Glenndale), Prince George Co., Maryland.

Type—Catalogue *No. 19924*, U.S.N.M., one of the above specimens on a tag, the head and hind tibia on a slide.

A CLASSIFICATION OF OUR LIMNEPHILID CADDICE FLIES.

BY NATHAN BANKS, EAST FALLS CHURCH, VA.

The Limnephilidæ are the most prominent family of caddice-flies in temperate regions. Their classification has been largely based on the spur formula; this is undoubtedly valuable, but as it broke down in places, I have tried many times to find other characters. I divided the group into two on the presence or absence of spines on the under side of the last joint of the hind tarsi. Dr. Ulmer has brought up a few exceptions. Some I believe are due to the fact that the species is wrongly placed, but in certain *Chætopteryx* it does not hold, but when used in connection with the armature of the front tibiæ, it is decisive. The venation in this family is most distressingly uniform, and I have found little not already utilized. The large bristles back or inward of the ocelli I have used as of generic value; and the development of the strips of bristles on the mesothorax I also consider important. I had hoped to find more characters in the face, and palpi; and think that the vestiture of face may yet be used with success. However, I present this preliminary table in the hope that its use may discover the weak points and suggest new characters. I am loath to make so many new genera; but I believe that all are distinct groups, and future study may show some of them to be better placed as subgenera.

KEY TO THE GENERA OF LIMNEPHILIDÆ.

1. Last joint of hind tarsus with one or more distinct (usually black) spines beneath; tibia I always spined to base ..... (*Limnephilinæ*) 2

   Last joint of hind tarsus without a distinct spine beneath: if one is occasionally present, then the tibia I is not spined to base ..... (*Drusinæ*) 18

2. No prominent macrochætæ behind or inward from ocelli, although sometimes hairs much smaller than macrochætæ; tips of fore wings not obliquely truncate 3

   At least one prominent macrochæta behind or inward from each ocellus, about equal in size to the macrochætæ of the posterior warts; tips of fore wings often obliquely truncate 13

3. Bristles on the veins no longer than those on the membrane, or barely so; membrane not granulate; median part of mesonotum with some bristle-bearing granules; the pronotum rather large; hind wings much excised on outer margin..4

Bristles on the veins noticeably longer than those on the membrane; median part of the mesonotum without bristle-bearing granules; hind wings scarcely excised on outer margin 5

4. Outer margin of fore wings sinuately emarginate; vertex without distinct posterior warts ..... *Glyphotælius*.

Outer margin of fore wings not emarginate; posterior warts distinct ..... *Arctœcia*.

5. In hind wings a cross-vein between the subcosta and radius near tip; vertex convex, smooth, posterior warts reduced ..... *Astenophylax*.

No such cross-vein in the hind wings, vertex flat; posterior warts well developed.....6

6. Vertex, part of thorax, and fore wings with dense appressed hair; basal cross-veins very weak; fore wings not granulate, with a median silvery stripe ..... *Hesperophylax*, n. gen. (*Platyphylax occidentalis* Bks.)

Vertex not with dense appressed hair.....7

7. Spurs 1, 2, 2, in hind wings the discal cell does not reach before the median fork; fore wing roughened..*Allegophylax*, n. gen. (*Platyphylax subfasciata* Say).

Spurs 1, 3, 3, or 1, 3, 4.....8

8. Spurs 1, 3, 4.....9

Spurs 1, 3, 3.....11

9. In the hind wings the discal cell reaches plainly before the forking of the median vein.....10

In the hind wings the discal cell not before the forking of median vein; membrane of fore wings roughened ..... *Eustenace*, n. gen. (*Stenophylax limbatus* McL.)

10. Large species; wings very broad; in fore wings the front side of discal cell is slightly concave ..... *Stenophylax*.

Smaller species: elongate wings; in fore wings the front side of discal cell is nearly straight.....*Rhadicoleptus*.

11. In the hind wings the discal cell but little if any before the forking of the median vein: second apical cell of fore wings wide at base, membrane granulate ..... *Pycnopsyche.*

    In the hind wings the discal cell plainly before the forking of median vein 12

12 Large full winged species; membrane not granulate ..... *Clistoronia*, n. gen. (*Halesus magnus* Bks.)

    Small, female short-winged; hairs on the membrane of fore wing as long as those on the veins ..... *Psychoronia*, n. gen. (*Psilopteryx brevipennis* Bks.)

13. Anal cell not divided at base; spurs 1, 3, 3; fourth apical cell in hind wings broad ..... *Platycentropus.*

    Anal cell divided as usual at base; spurs usually 1, 3, 4 14

14. Fifth joint of tarsus I with spines beneath; bristles on veins barely longer than on the membrane ..... *Grammotaulius.*

    Fifth joint of tarsus I without spines beneath; bristles on veins much longer than those on membrane 15

15. Hind wings strongly emarginate on outer margin near end of the cubitus; pronotum large and prominent; discoidal cell very long 16

    Hind wings scarcely emarginate at end of cubitus; pronotum less prominent 17

16. Fore wings long and slender, tips rounded ..... *Anabolina.*

    Fore wings shorter, tips more acute; pronotum longer ..... *Colpotaulius.*

17. Fourth apical cell in hind wings narrowed at base; mesothoracic strips long; outer margin of fore wings oblique ..... *Limnephilus.*

    Fourth apical cell in hind wings not narrowed at base; mesothoracic strips short; outer margin of fore wings more rounded ..... *Anabolia.*

18. Bristle-bearing granules scattered over the mesonotum without leaving a median smooth area; pronotum large and prominent; fork 3 in both wings pedicellate; spurs 1, 3, 4 ..... *Leptophylax.*

    Bristle-bearing granules arranged in two strips, leaving a smooth median area 19

19. Posterior and anterior anastomoses of fore wings not separated; no macrochætæ behind ocelli; forks 1 and 3 in hind wings pedicellate; spurs 1, 3, 4 ..... *Homophylax.*

Posterior anastomosis at least width of a cell before the anterior anastomosis 20

20. Outer margin of fore wings sinuately excised; macrochætæ behind ocelli; spurs 1, 2, 2 ..... *Glyphopsyche.*

Outer margin of fore wings entire 21

21. Fork 3 absent in hind wings 22

Fork 3 present in hind wings 23

22. Spurs 1, 3, 3; no wart between ocelli and the posterior warts ..... *Oligophlebodes.*

Spurs 1, 2, 2; a distinct wart between the ocelli and the posterior warts ..... *Neophylax.*

23. Stigma with a cross-vein at its base, or at least strongly coriaceous 24

Stigma without cross-vein, and not especially prominent 27

24. First apical cell narrowed at base; stigma not very prominent, but with cross-veins at base 25

First apical cell broad at base; stigma coriaceous 26

25. Spurs 1, 2, 4; discal cell of hind wings open ..... *Apatania.*

Spurs 1, 3, 4; discal cell of hind wings closed ..... *Allomyia*, n. gen. (*Apatania tripunctata* Bks.)

26. Spurs 1, 3, 3; membrane not granulate nor roughened ..... *Halesechila.*

Spurs 1, 2, 2; membrane more or less granulate; hairs on membrane as long as those on the veins ..... *Chilostigma.*

27. Each cheek with a prominent spine beneath; first apical cell extending a long way back on the discal cell ..... *Allophylax*

No such spine on the cheek 28

28 A large tuft of long hairs at anal base of fore wings; outer fringe on coxa I. longer than width of coxa; antennæ strongly crenulate beneath; ocelli large; tibia I densely spined to base; bristles of veins not prominent; in hind wings discal cell reaches long before forking of median vein; large species ..... *Dicosmœcus.*

Hair at anal base shorter, less dense, and that on anterior coxæ short; smaller species; bristles of veins usually distinct 29

29. Spurs 1, 3, 3 30
Spurs 1, 2, 2, or 1, 2, 4, or 1, 3, 4 32

30. Anal cell not divided at base; basal veins obsolete; radius bent at stigma; an ocellar macrochæta ....*Hylepsyche*, n. gen. (*Halesus indistinctus* Walk.)
Anal cell divided as usual, most of basal cross-veins distinct 31

31. Radius bent at stigma, which is very distinct; membrane not granulate ....*Halesochila*.
Radius scarcely bent at stigma, which is not especially distinct; no ocellar macrochætæ ....*Drusus*.

32. Spurs 1, 3, 4; no distinct ocellar macrochætæ 33
Spurs 1, 2, 2, or 1, 2, 4 35

33. Fork 3 in fore wings acute at base, sometimes pedicellate ....*Algonquina*, n. gen. (*Parachiona parvula* Bks).
Fork 3 in fore wings not acute, but reaching before the anastomosis 34

34. Anastomosis is placed before end of the subcosta; the apical cells very long ....*Anisogamus*.
Anastomosis beyond end of the subcosta, apical cells normal ....*Apolopsyche*, n. gen. (*Stenophylax minusculus* Bks.)

35. Ocellar macrochætæ present; spurs 1, 2, 4; wings rather narrow, first fork reaches a long distance back on discal cell ....*Ecclisomyia*.
Ocellar macrochætæ absent, spurs 1, 2, 2, or 0, 2, 2; membrane granulate 36

36. Discal cell shorter than the pedicel or barely longer ....*Potamorites*.
Discal cell much longer than its pedicel 37

37. Radial vein scarcely bent at the stigma, wings less broad ....*Ironoquia*. (*Chætopterygopsis parvula* Bks.).
Radial vein strongly bent at the stigma; wings broad ....*Chilostigma*.

Notes on the Genera

Arctæcia—Includes *A. consocia* Walk. The genus *Philarctus* is very close and perhaps identical.

Hesperophylax and *Allegophylax*—These were formerly included in *Platyphylax*, but, as already noted by McLachlan and Ulmer, not congeneric. *Allegophylax* also includes *P. lepida* Hag.

Eustenace—Includes also the *Stenophylax gentilis* of McLachlan.

Rhadicoleptus—Our *Asynarchus fumosus* and *A. flavicollis* will go in Wallengren's genus, and are quite different in appearance from the typical broad winged *Stenophylax*.

Asynarchus—The type species, *A. fusorius*, will run to *Anabolia*, and I see little reason for separating it; various other species, *iteratus*, *amurensis*, etc., will aslo go to *Anabolia*, but *A. cænosus* runs to *Stenophylax;* it should form another genus.

Clistoronia and *Psychoronia* include each only a single species.

Allomyia includes but one species.

Drusus—In this I include *Halesus sparsus* Bks. from Newfoundland.

Halesus—I do not find any true representatives of this in our fauna; in the above table it would run out near *Platycentropus*, having ocellar macrochætæ, and 1, 3, 3 spurs; but the anal area is normally divided.

Ecclisomyia—The European *Ecclisopteryx* has spurs 1, 2, 3; first fork not so far back on discal cell, and no ocellar macrochætæ.

Algonquina, type *Parachiona parvula* Bks., I propose for several species which I formerly kept in *Parachiona*, but the latter is quite different.

Ironoquia—Includes only the one species I have previously placed in *Chætopterygopsis*. In this latter genus there are ocellar macrochætæ. The genera *Heliconius* and *Anisitella* are really *Chætopterygopsis* with a variation in spur formula; they have the same peculiar fore wings, and also ocellar macrochætæ. *Cataclice* has no ocellar macrochætæ.

Limnephilus—This genus contains by far a larger number of species than any other genus in the family, and several are rather aberrant and show affinity to *Anabolia*. *Goniotaulius* should be maintained, but I have not been able to find characters, except that the ocellar macrochætæ are nearer to each other than in the true *Limnephilus*.

TWO DIPTERA OF THE GENUS RHAMPHOMYIA FROM COLORADO.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

The large and varied genus *Rhamphomyia* (Empididæ) is known to be of considerable antiquity, no less than twelve species having been described by Meunier from Baltic Amber. It is therefore not surprising to find a species in the Miocene shales at Florissant.

Rhamphomyia sepulta, n. sp.

Length 6 mm.; length of wing 5.65 mm.; wings brownish, no stigmatic cloud; head, thorax and legs black; abdomen slender, pallid; eyes well separated on vertex (the specimen apparently a female); antennæ with third joint elongate, but not so long and slender as in the amber species *R. errabunda*, *œdaloides* and *obtusa*. Venation of wings normal for the genus, the third longitudinal vein simple; anal lobe large and abrupt, the lower margin before the lobe with small bristles as in recent species; second anal vein continuing in a straight or nearly straight line apicad, not deflected downward at the basal corner of the anal lobe. The following measurements are in microns: Level of humeral cross-vein to separation of second and third veins, 720; end of second vein to end of third (in a straight line), 640; discal cell on first basal, 240; discal cell on second basal, 304; discal on second posterior, 80; discal on third posterior, 320; upper side of discal, 800. Miocene shales of Florissant, Colorado, Station 13 (*S. A. Rohwer*).

I take occasion to describe also a living species from a high altitude.

Rhamphomyia calvimontis, n. sp.

Male—Length 6 mm.; length of wing 7.5; shining black, with long black hair on head and dorsum of thorax; the face has a little black hair, a character of *Neocota* Coq., but the species does not seem otherwise allied to the type of that genus; sides of thorax grey-pollinose; abdomen with glistening creamy-white hair, a stiff band of bright ferruginous hair on the ventral surface subapically (0 in figure); wings grey. Metapleural bristles present. Legs entirely black. In Coquillett's key (Proc. U. S. Nat. Mus., XVIII, pp. 410-418) it runs next to the Californian *R. duplicis*. It is not identical with any of the species since described from

Alaska. Compared with *R. duplicis*, it is larger; eyes contiguous above, but the facets practically equal in size; antennæ black, third joint sublanceolate, the style about half its length; proboscis over 2 mm. long; thorax without dorsal pollinose vittæ; scutellum with numerous (many more than six) long black hairs; front and hind basitarsi large and hairy, middle ones small; knob of halteres dark brown. The second anal vein, differently from the fossil, is abruptly deflected downward at the basal corner of the anal lobe. In Bezzi's key of South American *Rhamphomyia* (1909) this falls nearest to *R. limbipennis* Bezzi. Above timber-line, in the Arctic-Alpine zone, Baldy Mtn., Boulder County, Colorado, July 24, 1915. (*Cockerell.*)

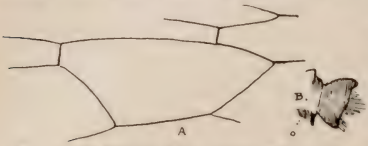

Fig. 2.—A. *Rhamphomyia sepulta:* discal cell. B. *Rhamphomyia calvimontis* lateral view of end of male abdomen.

I take occasion to correct two misprints in former papers on Diptera. In Can. Ent., 1915, p. 316, read *Chironomus guatemaltecus;* and p. 351, in fourth line of description, read greyish instead of greenish.

NEW SPECIES OF EUTETTIX AND PHLEPSIUS (HOMOPTERA).

BY E. D. BALL, LOGAN, UTAH.

The genus Eutettix is one of the most interesting of the groups of leaf-hoppers in the diversity of food plants of the different species, and at the same time in the constancy with which a given species is confined to its host.

At the time the writer published the review of this genus little was known of the life-histories or food plants of a number of western species of the *strobi* group. From circumstantial evidence it was thought that *saucia* would probably be found to occur on *Eriogonum*. Since that time this species has been found in some numbers on a species of this plant in California. The type specimens of *columbiana* described below were taken from

another species of this same genus of plants. The type of *nevada* from still another, while the type of *rubida* came from a location in which a species of *Eriogonum* grew and the colour of the plant would harmonize better with the striking shade of red of the insect than any other plant there. In addition to these records, *pannosa* has been found to be strictly confined to a shrubby species of *Eriogonum* on the hills of California. Another record which again shows diversity in food plants is that of *osborni*, which has been found by Van Duzee to be strictly confined to a species of Tamarix in California.

Eutettix columbiana, n. sp.

Resembling *perelegantis* and *mildredæ*, but lighter in colour and lacking the definite shades of orange and olive. Form of *saucia* nearly. Length: ♂ 5 mm.

Vertex roundingly right angled, the apex blunt, disc slightly sloping, depressed before the margin. Pronotum as in *saucia*, lacking the definite gibbous appearance of *perelegantis*. Venation as in *saucia*.

Colour ivory white, with a pale tawny and olive brown saddle with black points. Vertex creamy, with traces of four brown points on the margin, a pair of rather large irregular spots on the posterior submargin a little more than their own width from the eyes. Face and below creamy. Pronotum ivory, mottled with olive and brown, omitting the lateral and most of the anterior margin; two definite black spots behind the inner angle of either eye and two irregular ones nearer the median line. Scutellum creamy, the lateral angles olive brown. Elytra ivory sub-hyaline, with an olive brown saddle as in *saucia*, but lighter or wanting along the sutures, and with three definite dark points extending almost to the claval suture, apical cloud reduced to spots on third and fourth nervures.

Genitalia of male as in *saucia*.

Described from two males from Wenatchee, Washington, collected by the writer. From *saucia* this species can be separated by the definite black spots on the pronotum, from *perelegantis* by the structure of head and pronotum.

Eutettix nevada, n. sp.

Form of *saucia* nearly, with a similar saddle. Colour of *texana* or a pale *pannosa*. Length: ♀ 4.6 mm.

Vertex similar to *saucia*, slightly less sloping, pronotum very flat, much less arched than in *saucia*. Front very full, roundingly right angled with vertex. Venation as in *pannosa*.

Colour creamy white, mottled and washed with pale olive brown. Vertex creamy, traces of four brown spots on anterior submargin, three large, slightly irregular mottled areas along the posterior margin, the median one nearly rectangular, the lateral ones nearly circular. Pronotum mottled with pale brown, omitting the lateral margins and three narrow stripes on the disc. Scutelium mottled with pale brown, with two stripes. Elytra milky with the saddle of a pale mottled brown, omitting an irregular sutural stripe. The ivory margin along the claval suture is narrow and regular as in *pannosa*, without the posterior enlargement, as in *scitula*, and without the usual distinct dark margins. The saddle extends to costa, but the apical cloud is reduced to a few reticulations. A number of strong reticulations on basal area of the corium below the saddle.

Genitalia: Female segment rather long, slightly rounding posteriorly, with a slight, rather broad strap-shaped projection, which is dark-lined back on to the segment.

Described from a single female collected at Wells, Nevada, by the writer. The short head will separate this species from *pannosa*, while the strongly margined saddle renders it quite distinct from *saucia*. Its mottled appearance suggests *texana*, but that species does not have a saddle.

Eutettix rubida, n. sp.

Form of *pannosa* nearly. Shorter and broader with short apical cells. Colour and pattern of *saucia* nearly. Length: ♀ 4 mm.

Vertex and pronotum nearly flat as in *pannosa*. Vertex broader than in that species and equally long, the apex slightly obtusely angled. Whole margin inclined to be thin and slightly upturned before the depression. Elytra very broad and short.

Venation similar to *saucia*, except that the apical cells are only one-half as long. The central apical cell equally broad and long.

Colour red-brown and ivory. Vertex testaceous, the margins ivory, with four large nearly quadrangular spots before the depression. Pronotum densely mottled with rusty brown, omitting the lateral margins. Scutellum rusty brown. Elytra ivory, with a dark rusty brown saddle of the *saucia* pattern, the line next the claval suture nearly straight and not dark margined, the apical cells densely clouded.

Genitalia: Female segment moderately long, nearly truncate, with a broad, short, bilobed projection.

Described from a single female taken by the writer in Logan Canyon, Utah, altitude 6,000 feet. This is a strikingly distinct species, in the broad short form, short apical cells and long flat vertex.

Eutettix insana var. **coronata,** n. var.

Slightly smaller and paler than *insana*, with a variable number of black spots. Length 3 mm.

Vertex and pronotum shorter and broader than in *insana*. Elytra shorter and inclined to be more flaring.

Colour white as in *Phlepsius denudatus*, rather than green, as in typical *insana*, with a much smaller number of the "peppered" dots and a variable number of black spots. These black spots including all or part of the following: A pair of slightly oblique lines behind the middle of the vertex, six dots in an arcuated line on the anterior submargin of pronotum, the outer ones usually largest and located just behind the inner angle of the eye, four large black spots in a slightly curved line on the anterior part of the scutellum, two minute points on the lateral margins of the scutellum, four pair of equidistant spots along sutural margins of elytra, the third and largest pair at the claval apices, four spots on each elytron in an approximately straight line between the posterior angle of the pronotum and the second costal nervure, the first two in this row slightly in advance of the corresponding sutural spots, the second two opposite. These spots are all variable in size, and some are often wanting.

Described from two females and two males from Mojave, California, collected by the writer. This is a much smaller and

paler form than typical *insana*, and with the definite spotting would not be easily recognized as belonging to that species.

Eutettix (Mesamia) coloradensis var. **visalia,** n. var.

Form of *coloradensis* Pale fulvous, with light flecks on elytra.

Colour and general appearance of *johnsoni*, except for the black points on vertex. Vertex and face pale fulvous, with the line wanting or only slightly indicated in tawny. Pronotum and scutellum pale fulvous without definite markings. Elytra with the claval areas pale fulvous more or less flecked with oblong milky spots. Corium fulvous sub-hyaline, the nervures tawny and usually a tawny spot between the two cross nervures and faint dusky spots in the centres of the apical cells.

Described from two females and two males from Visalia, California, collected by the writer on *Artemisia dracunculoides*. If this had not been the food plant to which *coloradensis* is strictly confined this variety would scarcely have been referred to this species, as the colour is so strikingly different. The finding of this colour variety indicates a closer relationship between the *nigrodorsum* and *vitellina* groups than was even suspected when they were placed in the same subgenus.

Phlepsius loculatus, n. sp.

Resembling a diminutive *costomaculatus* in appearance, but much smaller. White, with two stripes and coarse elytral reticulations dark. Length 3-3.5 mm.

Head with the eyes much wider than pronotum; vertex narrow, slightly longer than its basal width, as long as pronotum, slightly obtusely angled with the apex bluntly rounding, disc nearly flat, anterior margin forming an acute angle with the front; front long, narrow, wedge-shaped. Elytra long, narrow, venation as in *costomaculatus*, the apical cells extremely long.

Colour dark brown or black and white, giving an ashy gray appearance. Vertex milky white or sometimes suffused with yellow, two pair of brown dots on the extreme margin against the apex, a pair of slightly oblique, elongate, egg-shaped dark spots extending from just behind the anterior pair of spots to posterior margin, each dark spot containing two light spots in the shape of an oblique crescent above a dash. Sometimes the dark spots

coalesce with the outer dots when the whole appears as a pair of stripes, in which case the crescent and dash fuse to form a question mark. Pronotum milky, with four broad, mottled, dark brown stripes, the outer pair definite and touching the inner angle of the eye, the inner pair irregular and often fading out posteriorly. Elytra milky with the most of the nervures and a few coarse reticulations as in *costomaculatus* almost black

Genitalia: Female segment short, posterior margin slightly indented in the middle, pygofers extremely long and almost parallel margined. Male valve triangular, plates together equilaterally triangular.

Described from four females and four males from St. George, Utah, and Mojave, California, collected by the writer. This species is quite puzzling in character; in elytral characters it is close to *costomaculatus*, but differs radically in the extremely wide head. In size it is unique in the genus, but in Deltocephalus where the occasional second cross nervure would, if considered, place it, it would seem at home. It is, however, unquestionably related to the other forms mentioned. The white markings in the black spots are a striking and very distinctive character.

Phlepsius stellaris, n. sp.

Larger and stouter than *loculatus*, which it resembles in form and structure, resembling *denudatus* in the light colour and lack of reticulations. Creamy white, with two star-like spots on vertex. Length: ♀ 4 mm.

Head broad as in *loculatus*, vertex shorter and broader, obtusely rounding, scarcely longer on middle than against the eye, two-thirds the length of the pronotum. Front shorter than in *loculatus*, forming a wider angle with vertex. Elytra long, narrow, venation as in *costomaculatus*, but obscure.

Colour creamy white, the ocelli and four equidistant spots on vertex margin between these dark, a pair of irregular star-shaped spots on the anterior disc of the vertex, one ray of each star, including the outer marginal spot, on either side and another touching the eye; a spot on either side of scutellum at base, extending forward under the semitransparent pronotum, and often a dot or two behind the eyes. Elytra creamy, the nervures showing

a trace of fulvous, rather obscure. Face and below creamy, a pair of brown arcs on either side of the front between the antennal sockets, attached to a brown cloud in the centre, forming a spider-like marking on face.

Genitalia: Female segment broad and short, almost parallel margined with a slight median notch.

Described from four females from St. George, Utah, and vicinity collected by the writer. This species, although still small for the genus, is nearly twice as large as *loculatus*, to which it seems to be allied. The white ground colour, with the black stars, render it strikingly distinct.

A NEW *PHYSOTHRIPS* (THYSANOPTERA) FROM UGANDA, WITH A NOTE ON *PHYSOTHRIPS ANTENNATUS* BAGNALL.

BY J. DOUGLAS HOOD, U. S. BIOLOGICAL SURVEY, WASHINGTON, D. C.

The new species here described from a unique female was received from Dr. Henry J. Franklin, of the Massachusetts Agricultural Experiment Station, and had been included with a number of specimens of *Physothrips antennatus*, collected by Mr. C. C. Gowdey at Kisube, Uganda.

Physothrips antennatus, Bagnall.

1914.—*Physothrips antennatus* Bagnall, Ann. Mag. Nat. Hist., ser. 8, Vol. XIII, p. 23.

1914.—*Physothrips antennatus* Karny, Zeitschr. f. wiss. Ins.-biol., Bd. X, p. 365.

The brief original description of this species may be amplified as follows:

The median dorsal length of the head is about 0.7 the width across eyes, and about three-fourths the length of the prothorax; the cheeks are gently rounded, converging to base. The pronotum is finely and deeply striate, with a pair of nearly smooth, foveate areas behind middle; hind margin with three pairs of bristles between the two long pairs, the mediad pair larger; disk with about 25 small bristles on each side. Mesonotum slightly more closely transversely striate than the pronotum; metanotum sub-

concentrically striate. Wings brown, basal fourth much paler, gray. Segment 8 of abdomen unarmed, without the usual comb-like fringe on posterior margin.

Physothrips xanthocerus, sp. nov.

(Fig. 3, a and b.)

Female (*macropterous*).—Length about 1.1 mm. Colour dark blackish brown, nearly black, with antennal segments 3-8, all tarsi, and distal half of all tibiæ, light lemon yellow; fore wings brown, pale gray in basal fourth.

Head about three-fourths as long as greatest width, sides rounded and converging to base; occiput with several anastomosing

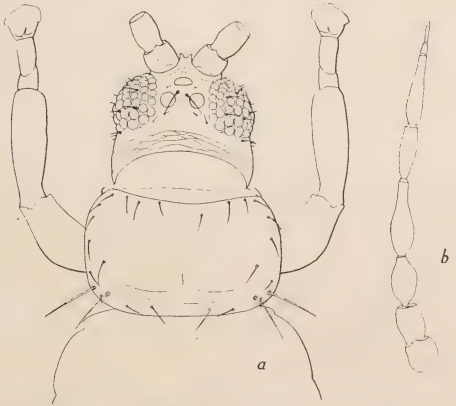

Fig. 3.—*Physothrips xanthocerus*, n. sp., female, holotype; b, antenna.

lines; interocellar bristles less than one-fourth as long as head, situated well within the ocellar triangle; a pair of smaller bristles in front of, and a second pair behind posterior ocelli; postocular bristles small, three pairs in profile at posterior angles of eyes. Eyes about 0.6 as long as head and slightly narrower than their interval. Ocelli equidistant, subequal in size, posterior pair opposite middle of eyes. Antennæ about three and one-fourth times as long as head, form of segments shown in figure, unusual

in that fourth segment is very long and produced distally into a narrow stem; segments 1 and 2 nearly concolorous with head, 3-8 lemon yellow, the three distal segments shaded with gray.

Prothorax about 1.1 times as long as head and about 1.7 times as wide as long; pronotum smooth, absolutely without sculpture; two strong dark bristles at posterior angles, and between these along posterior margin two smaller pairs, the inner larger; anterior and lateral margins each with about five pairs of small, subequal bristles, in addition to a similar pair at the anterior angles and a slightly stronger pair almost directly in front of the inner long pair at posterior angles; no other pronotal bristles. Wings of fore pair about fifteen times as long as width at middle, dark gray-brown in distal three-fourths, basal fourth pale gray, slightly clouded basally; costa with about 28 bristles; anterior vein with four pale bristles in a basal group, followed immediately by another series of 13 or 14, and then by two, well separated, near apex; posterior vein with 16 or 17, commencing just beyond the first bristle in the long series of anterior vein.

Abdomen of normal form, with a few very faint anastomosing lines of sculpture on basal segments; segment 8 unarmed, without the usual comb-like fringe on posterior margin; segment 10 not divided above, though irregularly weakened along dorsal line near apex; abdominal bristles long, strong, brown.

Measurements of holotype: Length 1.08 mm.; head, length along median dorsal line, 0.105 mm.; width, 0.140 mm.; prothorax, length 0.114 mm.; width 0.194 mm.; pterothorax, width 0.255 mm.; abdomen, width 0.300 mm.

Antennal segments	1	2	3	4	5	6	7	8
Length (μ)	29	36	50	75	53	67	11	22
Width (μ)	32	26	26	23	16	17	7.	5

Total length of antenna, 0.343 mm.

Described from one female collected by C. C. Gowdey, at Kisube, Uganda, on coffee (No. 3582).

Closely allied by the elongate fourth antennal segment to *Physothrips antennatus* and *Ph. antennalis*, but differing from both in the pale antennæ, and from the former, at least, in the smooth, sparsely spinose pronotum.

THE LIFE-HISTORY OF *LEUCOBREPHOS BREPHOIDES* WALK. (LEPIDOPTERA).*

BY ARTHUR GIBSON AND NORMAN CRIDDLE.

Leucobrephos brephoides Walk. was for several years known in Canadian collections as *L. middendorfi* Men. It was not until 1907† that the late John B. Smith corrected the error and stated that the former "is the only species thus far known to inhabit North America." In the Entomological Record, for the years 1901 and 1903, the species is recorded under the name *middendorfi*, which name is also used by Fletcher in *The Ottawa Naturalist*, XXIII, 67.

We have been much interested in the habits and life-history of this interesting and rare moth. In 1903, the junior author forwarded to the late Dr. James Fletcher some eggs of the species, and these and the larvæ were then studied, as time permitted, by Fletcher and the senior author. In 1915, Mr. F. H. Wolley-Dod forwarded, to Ottawa, 35 eggs, which had been obtained at Midnapore, Alta., on April 5-10. These latter gave us an opportunity of studying, more definitely, the preparatory stages. The notes made by Fletcher, in 1903, were incomplete, but such as are of value we include herewith.

The Egg.—0.5 mm. in diameter; 0.9 mm. in length; oblong, rounded at both ends; indistinctly longitudinally striate; densely granulate-punctate, the granules acute and irregularly connected to form faint transverse ridges.

When received from Mr. Dod (April 20) the ova were darkened preparatory to hatching. Fletcher, in ms., states that the colour of the egg is "pinkish-ochre at first, turning a leaden gray before hatching." The egg shell is opalescent; the larva emerges through a rather large, ragged, hole at one end.

The eggs which were sent to Fletcher in 1903 were laid in confinement at Aweme, Man., on April 15-16. Fletcher's ms. note reads: "Laid on the leaf scars of young shoots of *Populus tremuloides*, above the scar, and deposited flat on their sides, 2 or

*Contribution from the Entomological Branch, Department of Agriculture, Ottawa.

†Canadian Entomologist, XXXIX, 370.

3 sometimes at a single scar." The junior author has frequently found the eggs under natural conditions near the tips of the branches of Aspen Poplar, the place selected being the scar left by the fallen leaves of the previous autumn. Oviposition has been noted high up among the terminal twigs of trees, thirty feet or more in height; at other times the female moths were observed to choose a tree of about five feet in height. As a rule, not more than one egg is deposited on a leaf scar. From close observation, made on three occasions, a single female moth undoubtedly deposits several eggs on the same tree. In one instance the junior author noticed a female visiting at least a dozen different situations on the same tree for the purpose of oviposition. The largest number of eggs obtained from a single female was 135. This individual was collected at Aweme, Man., on 14th April, 1903, and in confinement continued ovipositing for six days.

The eggs which were deposited at Midnapore, Alta,. on April 5-10, mostly hatched at Ottawa, on April 21 and 22.

Description of Larval Stage.

First Instar.—The newly-hatched larva is 2.0 mm. in length and dark-green in colour. Head 0.3 mm. wide, rounded, somewhat quadrate, darker than body, of a greenish-brown shade, margined posteriorly with brown; ocelli black. No markings on body; lateral area and dorsum of first thoracic segment, paler. Tubercles pale brownish, indistinct, circled with sordid whitish; setæ short, stiff, very conspicuous. Spiracles brown. First three pairs of prolegs aborted. Feet concolorous with body. After feeding, the larva is of a greenish-gray colour.

Second Instar.—Length 5.5 mm. Head 0.6 mm. wide, greenish-white, with dark green blotches, particularly on cheeks; ocelli black; mandibles pale reddish. Body marked longitudinally with pale white stripes as follows: addorsal stripe; subdorsal stripe wider than addorsal stripe; lateral stripe, just above tubercle iii; wide stigmatal band enclosing tubercles iv and v (the skin here is conspicuously wrinkled); and a rather indistinct medio-ventral stripe. Ventral surface distinctly glaucous. Tubercles brown. Spiracles dark brown, white in centre. Prolegs concolorous with venter. As the stage advances the skin of dorsum, particularly

on posterior segments, assumes a yellowish-green tint. The wide stigmatal band is the most conspicuous marking on the body.

Third Instar.—Length 8 mm. Head 0.9 to 1.0 mm. wide. The larva in this instar is similar in appearance to the second instar. The venter is decidedly glaucous. All the stripes are distinct and white in colour. The stigmatal band is wide and conspicuous, and more or less tinged with yellow. Length before third moult 10.5 mm.

Fourth Instar.—Length 12 mm. Head 1.5 to 1.7 mm. wide. Body dark velvety green, later becoming a paler green. The addorsal and lateral stripes irregular but distinct; stigmatal band very conspicuous, extending to end of anal flap, the edges being even. Medio-ventral stripe inconspicuous. All markings white. Tubercles circled with white. Venter distinctly glaucous. Length before fourth moult 15 mm.

Mature larva—Fifth Instar.—Length 18 mm. Head 2.2 to 2.5 mm. wide, rounded, somewhat quadrate, depressed at vertex; smooth, paler green than body and of a glassy appearance; clypeus high; ocelli black, between the ocelli the skin is whitish, like enamel; labrum also whitish; mandibles reddish-brown. Body cylindrical, lettuce green* in colour, with a yellowish reflection, excepting venter, which is glaucous. The folds between the segments are yellowish. The addorsal stripe, the subdorsal stripe and the lateral stripe are thinner than in previous instars and hence are not so distinct. In colour they are now decidedly yellow. The wide, bright pale-yellow stigmatal band is very conspicuous from the back of the head to the end of the anal flap, where it narrows. The two dorsal and the lateral stripes are more or less broken and sinuous in outline. The lateral stripe is distinctly wavy on the thoracic segments. Medio-ventral stripe now distinct, of a milky white colour. Spiracles whitish, ringed with black. Tubercles minute, circled with pale yellow, each bearing a short black hair. On abdominal segments tubercle iii is nearly midway between the lateral line and the spiracle, and immediately above the spiracle, excepting on segments 6, 7, 8, 9 and 12, where it is noticeably

*Ridgeway's Colour Standards and Colour Nomenclature, 1912.

anterior. Tubercle iv, behind the spiracle, v almost immediately below the spiracle, both enclosed in the stigmatal band, the former near the upper edge and the latter near the lower edge. Thoracic feet pale, somewhat translucent; prolegs concolorous with subventral area; crotchets slightly pinkish; legs on segment 10 normal, on segments 9, 8 and 7 much reduced, the latter being the smaller and decidedly rudimentary. Length of full grown larva at rest 26 mm.

The Pupa.—Length 12-14 mm.; width at widest part 5 mm. When newly formed green, soon changing to pale brown, and later to dark reddish-brown; thorax and wing-covers darker, almost blackish, wrinkled; abdominal segments coarsely pitted on anterior three-quarters and minutely pitted on posterior one-quarter. Spiracles pale yellowish in centre. Cremaster two-spined, the spines stout and arising from either side, curved outwardly from towards the tip, and forming, almost, a perfect letter U.

Food Plant.—All larvæ reared at Ottawa were fed on the foliage of Aspen Poplar, *Populus tremuloides* Michx. This tree is the only food plant upon which we have found the larvæ feeding under natural conditions.

Habits of Larva.

During the different instars the larvæ spun considerable silk. Under natural conditions, at Aweme, Man., they have been frequently observed hanging at the end of a silken thread spun from the branches of Aspen Poplar. This habit and that of looping when walking corresponds well with many of the Geometridæ. A ms. note by Fletcher reads as follows: "A semilooper, the three first pairs of abdominal legs not used in walking, although apparent. When at rest the young caterpillar rests as a geometer on the anal and fourth pairs of abdominal prolegs, with the front of the body raised. The larvæ have the same habit as *Brephos infans* of catching several leaves tightly together with single threads, and when resting, either lie along the petiole or inside a curl of a young leaf. When they began to feed, they attacked the edge of a leaf or ate straight into the surface either above or below."

When mature the larvæ entered the earth to pupate. The larvæ studied in 1915 were full grown on May 15 and 16. By May 20 all had changed to pupæ. The earthen cell is slight.

On June 13, 1902, two larvæ in the last instar collected at Aweme, Man., were received at Ottawa. On the earth in the breeding jar small pieces of bark and rotten wood were placed to see if the larvæ would use such for pupation. Both specimens, however, entered the earth (June 14) and there transformed to pupæ (June 17).

Habits of the Adult.

The moth of *Leucobrephos brephoides* is a sun-loving creature, being most active between the hours of 11 a.m and 3 p.m. It is among the earliest of the moths to appear in spring. It has been collected in Manitoba as early as March 18 and as late as May 11. The time of emergence from over-wintering pupæ is, of course, largely governed by the prevailing climatic conditions. It is not unusual to see the moths on the wing before the snow has all disappeared. Oviposition habits have already been referred to. Owing to a quick, jerky, flight and habit of darting upwards at the least sign of alarm, and also in view of the fact that the moth has a marked colour resemblance to the surrounding landscape, it is difficult to follow with the eye and individuals, therefore, are extremely hard to catch. Its remarkably acute eyesight and habit of flight undoubtedly account for its rarity in collections.

Experiments with the usual "sugar" mixtures, in daytime instead of at night, indicated that such are of no value to attract the moths. They have, however, on several occasions been induced to alight upon putrid flesh, which had been placed on the ground. The moths also seek moisture and are often found frequenting muddy roadways in the vicinity of aspen woods.

Distribution.—Midnapore, Alta., April 12-19, 1914 (Tams), April 7-10, 1915 (Dod and Tams); Saskatoon, Sask., April 11, 1913 (Willing); Beulah, Man., April 16, 1903 (Dennis); Aweme, Man., collected almost every year since 1901, earliest date March 18, latest date May 11 (Criddle Bros.); Rounthwaite, Man. (Marmont); Winnipeg, Man., April 17, 1910 (Wallis); Hymers, Ont., April 9, 1908 (Dawson); Mayo River, Yukon Territory, April 16, 1907 Davidson); Portage at Grand Falls, Hamilton River, Labrador, May 12, 1894 (Low); Jenerk, Klutlan Glacier, elevation 5,500 feet, 141 Meridian, North of Mt. Natazhat, May 2, 1913 (Nesham).

In addition to the above localities the species has been recorded by Walker* from "St. Martin's Falls, Albany River, Hudson's Bay (Dr. Barnston)"; "Fort Confidence (Sir J. Richardson)"; by Grote† from "Yukon River, mouth of Porcupine River (R. Kennicott)"; and ‡ "Racine, Wis. (P. R. Hoy)"; and by Zeller†† from "Fort Resolution am Sklaven-see (Great Slave Lake) Westlich von der Hudson's Bay unter dem 61° N. Br. (Baron Osten Sacken).

*C. B. Mus. Het. XI, 702, 1857.
†Proc. Ent. Soc. Phil. III, 74, 1864.
‡Bull. Bkln, Ent. Soc. III, 30.
††Stett., Ent. Zeit. XXIV, 136.

NEW SPECIES OF MICROLEPIDOPTERA.

BY ANNETTE F. BRAUN, CINCINNATI, O.

Coptodisca magnella, n. sp.

Palpi and lower part of face silvery white; head with a decided pale golden lustre. Antennæ fuscous.

Thorax and basal half of fore wings pale silvery gray, almost white; extreme costa on basal half black. Apical half of fore wings golden yellow; a triangular silvery white spot at the apical third of the costa edged with black on both sides; a similar but narrower spot a little anterior on the dorsal margin, also edged with black on both sides. The outer edge of the dorsal spot forms part of the dark patch of scales which extend from it to the dorsum and termen. This patch is often pale gray and ill-defined, except at its outer edge, which is marked by a row of dark scales along the termen. It is separated from the dark margins of the costal silvery spot by the golden ground colour. Beyond the costal spot and almost parallel to its outer margin is a streak of black scales. Apical patch wedge-shaped, formed of a circular velvety black spot, and the terminal row of black scales immediately beyond it. It is preceded and edged on either side with one or two silvery white scales; and well separated from the dark dorsal patch by the golden yellow ground colour. Cilia whitish yellow, with an apical black pencil extending outward from the apical black patch. Hind wings gray.

Legs yellow, except the fore tibiæ and all the tarsi, which are fuscous. Abdomen fuscous above, yellow beneath.

Expanse: 5-6 mm.

Nine specimens, Lancaster, Ohio, bred from mines on leaves of huckleberry, *Gaylussacia baccata* (Wang.) Koch. The mine is of the usual character in the genus, starting as a narrow linear mine which abruptly enlarges into a semitransparent blotch (10 by 3 or 4 mm.). The elliptical case is attached as usual by a silken band to a leaf or twig. Mines which were collected August 21, 1914, produced imagos May 10-17 of the following year.

This is the largest species of the genus thus far described. Apart from its size, it may be distinguished from other species chiefly by the pale basal half of the fore wings and the fact that the dark dorsal patch never extends nearer the costa than the apex of the dorsal silvery spot, and therefore the ground colour extends without interruption between the silvery spots to the termen beneath the apical spot.

It is most closely related, particularly in character of mine and shape of pupal case, to *C. ostryæfoliella* Clem., of which there seems to be no published description. To supply this the following brief description of *C. ostryæfoliella* is given.

Coptodisca ostryæfoliella Clemens.

Antennæ fuscous; head with other appendages pale silvery gray.

Thorax and fore wings in the basal half pale silvery gray; apical half of fore wings yellow. At the apical third is a triangular silvery white spot dark margined on both sides. A little anterior on the dorsal margin, a similar but smaller and shorter spot narrowly separated from the costal spot by the ground colour or by the costal-wards and proximal extension of the dark dorsal patch lying beyond the dorsal white spot. This dark patch extends nearly or quite to the apical fan-shaped black spot, which is preceded and edged as usual by one or two silvery scales, and from which the usual black pencil extends outward into the cilia, which are whitish. Preceding the apex in the costal cilia is an almost perpendicular streak of black scales. Hind wings pale gray.

Abdomen gray above, silvery beneath. Legs silvery with dark fuscous tarsi.

Expanse: 4-4.2 mm.

Bucculatrix crescentella, n. sp.

Face whitish, tuft on the vertex whitish, more or less intermixed with ochreous or dark brown hairs.

Fore wings usually brown; sometimes paler, almost buffish ochreous. A whitish streak, sharply defined in dark specimens, extends from the base for one-half the wing length above the fold; immediately beneath the ground colour is somewhat darkened. At the middle of the costa is a narrow oblique curved white streak, concave outwardly; beyond it a less oblique white streak pointing toward the tornus; between these streaks the ground colour is a darker brown. On the middle of the dorsum is a half crescent-shaped dark brown spot, bordered before and behind with whitish. A triangular white spot immediately precedes the apex and lies above an irregular black spot, beyond which a line of dark scales crosses the apical cilia. Hind wings gray, brown or ochreous tinged.

Legs yellowish, marked with fuscous; hairs on posterior tibiæ pale ochreous.

Expanse: 7-9 mm.

Described from a series of bred and captured specimens. This is one of the commonest species around Cincinnati; it occurs also at Toronto, Canada. Mines may be found plentifully on species of *Compositæ* belonging to several genera (*Aster* spp., *Solidago* spp., *Erigeron* spp.). The larva makes a trumpet-shaped mine, gradually increasing in diameter and marked by a central line of frass. On rare occasions it deserts one mine to form another, but is at no time an external feeder. The cocoon of the usual *Bucculatrix* type is a white elongate ribbed structure.

Lyonetia candida, n. sp.

Face, palpi and antennal eye-cap silvery white; antennal stalk gray. Tuft on the vertex white, with a few blackish hairs, especially behind.

Fore wings shining pure white, except in the apical part. Just before the costal cilia is an oblique triangular grayish streak, apparently formed by the confluence of two narrower streaks, which are sometimes indistinctly separated from one another by white ground colour. This is followed by three perpendicular, slightly curved black streaks in the cilia preceding the round black

apical dot. The last of these meets a similar black streak projecting into the cilia below the apex The oblique triangular costal streak meets in the middle of the wing the apex of a grayish V-shaped mark placed at the tornus. The space between the arms of this mark is sometimes suffused with gray. A yellow patch occupies the apex of the wing and is margined along the termen by blackish scales. A black streak projecting out into the apical cilia from the apical dot is crossed at right angles by a nearly straight black line. Hind wings and cilia gray.

Abdomen gray, white beneath. Legs whitish, tarsal segments tipped with black.

Expanse: 9-10.5 mm.

Three specimens, Santa Cruz Big Trees, Calif., the larvæ mining leaves of Azalea, *Rhododendron occidentale* Gray, July 21; one specimen, Mt. Rainier, Wash., mining leaves of the white Rhododendron, *Rhododendron albiflorum* Hook., August 15. The imagos appeared August 4-7 and August 28.

The early long very narrow linear mine (3-4.5 mm.) abruptly enlarges into an irregular blotch. The pupa is enclosed in a slight white cocoon.

This species is nearest to *L. latistrigella* Wlsm., also a *Rhododendron* miner; but differs strikingly from it in the absence of the conspicuous curved black streak from the middle of the dorsum.

NOTES AND QUERIES.

Notes on Some Miscellaneous Economic Insects Found in New Jersey.

Callopistria floridensis Guen. (Lep.). This insect, known as the Florida Fern-Cutworm, which has already been recorded by me as occurring in New Jersey (Canad. Ent., Jan. 1915), and doing considerable damage to ferns in greenhouses, was found to be effectively controlled by spraying with fresh pyrethrum, one ounce to one gallon of water, plus one half ounce of soap. One large fern grower in New Jersey applied the above spray once a week for five or six weeks and gained complete relief. Pyrethrum was also applied with a bellows, and similar results obtained. Mr. J. J. Davis, in the 27th Report of the State Entomologist of Illinois, advocates the use of this material, which is undoubtedly the best insecticide to use against this pest.

Phytomyza chrysanthemi Kowarz. (Dip.). In the 1909 list, "Insects of New Jersey," the Chrysanthemum Leaf Miner or Marguerite Fly, as it is also called, is recorded under the genus *Napomyza* from one locality. As a matter of fact, it is present every year in various greenhouses in northern New Jersey and does considerable damage to chrysanthemums. The larvæ mine the leaves, and the irregular whitish lines and blotches often take up an entire leaf surface. In addition to this disfigurement of the foliage, the size and number of flowers is often reduced. While nicotine solutions are effective against this insect (Sanders, J. G., A Remedy for Chrysanthemum Leaf Miner, Jour. Econ. Ent., vol. V, No. 6, p. 472), many greenhouse men persist in using the more or less unsatisfactory method of picking off and destroying infested leaves.

Oberea tripunctata Swederus. (Coleop.). Every year while inspecting nurseries it is customary to run across the work of the Dogwood twig-girdler. Smith, in "Insects of New Jersey," records it as occurring throughout the state. Its presence is detected by a withering of the leaves at the tip of the infested shoot. While it is undoubtedly widely distributed in New Jersey, it never, as a rule, occurs in sufficient numbers to do any considerable damage.

Hemichionaspis aspidistræ Sign. (Homop.). In many fern houses in New Jersey this scale insect assumes the importance of a first-class pest. It is also being continually introduced into many houses on aspidistra imported from Belgium. As a rule, it is found on the lower leaves of the ferns, and by its spotting in bad infestations often makes the plants more or less unsalable. Unfortunately there is no satisfactory remedy, and the insects are usually got rid of by pulling off and destroying infested leaves during the operation of repotting or turning over the stock.

Isosoma orchidearum Westw. (Hymen.). Known as the Cattleya Fly, this member of the *Chalcididæ* is an important pest in practically all orchid houses in New Jersey where *Cattleya* species are grown. The adult deposits one or more eggs in the bud, and development and pupation takes place inside, the bud finally becoming more or less swollen. In some cases I have found as many as six larvæ in a single bud. While fumigation with nicotine extracts to kill the adults is recommended as being the most efficient

method of control, I have never met an orchid grower who practised it. Most of them prefer to cut off and destroy the infested buds. If this operation is kept up persistently by an experienced man, it is only a question of time until the insect is eradicated. The man, however, must be experienced in detecting the infestations, otherwise many healthy buds will be destroyed. Many growers become quite expert in this, and can distinguish at a glance between a healthy and infested bud, both of which will seem perfectly normal to the ordinary observer. This insect also is undoubtedly being continually introduced in orchids imported from South American countries.

Aphrophora parallela Say. (Homop.). During June, 1915, many pine trees in a nursery at Elizabeth were observed to be rather plentifully infested by the above spittle insect, the white frothy masses giving the trees the appearance of having been decorated for Christmas. No injury to the trees could be detected, but it was somewhat unusual to find them occurring in such comparatively large numbers. It was noticed after collecting the nymphs that their bodies shrunk in five or six hours to one-third of their normal size.

Cecidomyia resinicola O. S. (Dip.). During June, 1915, many characteristic whitish masses of pitch inhabitated by numerous orange-coloured larvæ of the fly were observed on the undersides of pitch-pine branches in nurseries at Springfield and Elizabeth. They attracted considerable attention from the nurserymen on account of their noticeable numbers, but no apparent damage was being done.

Corythuca arcuata Say. (Hemip.). Every summer this lace bug and its curious groups of eggs, which resemble certain forms of fungi, may be found on the leaves of oaks and other trees in various parts of the state. As a rule, it receives very little attention, although some seasons it is abundant enough to cause a whitening and withering of the foliage. Some day when it transfers its affection from forest to lawn trees, it may rank as more of a pest.

HARRY B. WEISS, New Brunswick, N. J.

ASPIDIOTUS ULMI JOHNS.

I have taken this insect on the following host plants in Missouri: *Catalpa catalpa; Ulmus* sp.; *Ptelea trifoliata* and *Juglans nigra.*

The scales were in abundance on all except the wafer-ash (*Ptelea trifoliata*), being thickly crowded between and under the rough bark. On the wafer-ash, however, I found only a few isolated scales, and these were located near the extremities of the twigs, the Ptelea being only a shrub a few feet tall. I have found no references to this scale attacking either Ptelea or Juglans, and so I offer these two as new host plants of *A. ulmi*. The scales winter over as nearly full-grown adults.

A. H. Hollinger,
University of Missouri, Columbia, Mo.

AN APPARENTLY NEW SPECIES OF PHALONIA.

BY WM. BARNES, M.D., AND J. McDUNNOUGH, PH.D., DECATUR, ILL.

Among some material sent us for determination by the Bureau of Cereal and Forage Insect Investigation were specimens of a Phalonid bred by Mr. C. N. Ainslie at Elk Point, S. Dakota from *Spartinana michauxiana* in the stems of which the larvæ were boring, apparently along with those of *Tortrix clemensiana* Fern. since a specimen of this species was included under the same breeding number. As we can find no name applicable to this species, we describe it as new as follows:—

Phalonia spartinana, n. sp.

♂.—Head, thorax, and primaries pale ochreous, the latter shiny and immaculate with the exception of a minute dark dot at the end of the cell at the origin of vein 5 and another below the origin of vein 2; the costal margin at the basal half is dark brown; secondaries pale smoky, with whitish fringes. Beneath primaries deep smoky, with the exception of the pale costal margin and fringes; secondaries much as above. Expanse 20 mm.

♀—Similar to the ♂ but larger and without the dark costal margin and dot below vein 2; secondaries without the smoky shade. Beneath the primaries are less smoky and more ochreous than in the ♂. Expanse 25 mm.

Types: 2 ♂'s, 1 ♀. Elk Point, S. Dakota (C. N. Ainslie). Coll. Barnes.

Related to *Phal. atomosana* Busck, but smaller, paler and lacking the sprinkling of brownish atoms characteristic of this species.

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POPULAR AND PRACTICAL ENTOMOLOGY.

Fresh Woods and Pastures New.

BY FRANCIS J. A. MORRIS, PETERBOROUGH, ONT.

I.

Love of novelty never fades: it is the will-o'-the-wisp that lures us on in the morning of our years, and many a dance it leads us through the day. But long before noon we become aware of a steady glow from the opposite quarter: it is the glamour of the past and is destined to brighten our declining days in the evening of life. This charm of the old familiar things so grows on us that at last nothing grips the heart quite like meeting old friends; and among our friends surely not least are the flowers and their myriad winged visitors, so intimately associated with many a long summer's day ramble. So it comes about that a new locality, neither distant enough to be strange, nor near enough to be stale, beckons with both hands (as it were) by this double lure of new and old.

It was the beginning of May when I first set out to conquer the hinterland of my new home in Peterborough, armed to the teeth (almost) with Gray's botany and a cyanide jar. I had heard so often of the great Cavan swamp that I felt it must be subjugated first and a pretty heavy toll exacted of *flora* and *fauna*. One or two who took the trouble to answer me when I pestered them with questions, had told me that if I went far enough west on Smith Street I would certainly find the swamp. So out I marched, bag and baggage, and, sure enough, less than an hour brought me to a great stretch of wooded swamp on the north of the road: a fringe of willows and cedar, a broad belt of tall poplars, and, beyond that, tamarack, spruce, balsam—yes, and over yonder to the northeast, hemlock and a large hardwood of maple—sights to make the botanist's heart beat. But alas! man, who murders to dissect, has drained the Cavan swamp in a vain effort to reclaim

the land; the natural growth of sphagnum has been killed and the floral wealth of Cavan is no more. All this I had yet to discover.

The day was bright, but a cold wind had encountered me on the road, that fought obstinately against my advance, hanging on my flank and stinging me with its slings and arrows. In the shelter of the swamp these missiles hurtled harmlessly over my head, while I roamed about through the hush of shadowed groves and across sunlit glades to the soft music of drumming partridges: they seemed to be everywhere in the heart of the swamp, and from time to time as I pressed forward I would flush one of the drummers from its retreat a few paces off. After about an hour of progress I found myself in a thick growth of cedars, and, working east a few rods, emerged at a great clearing just south of the G.T.R. between Peterborough and Best's. Between me and the railway was a wide sluggish stream of peaty-looking water—known (I believe) as a municipal ditch. The clearing extended east from where I stood for half a mile, with the drain on the north and a hardwood bush on the south; its greatest width was about 200 yards. It had been covered with small trees, mostly cedar, poplar, alder and elm; these had been nearly all cut down and much of the débris was lying on the ground. However, a fringe of alders still stood along the south bank of the stream, and the west end of the clearing had not been so heavily slashed.

While standing on the edge of this clearing I spied a large *Chrysomela* crawling up a burnt stump among the alders. It had the usual ebony pattern on its elytra; but instead of being creamy white, the ground colour was a rich chestnut. At the point of capture the insect dropped to the ground, but I was not to be denied, and a few minutes' search revealed my prize under a dead leaf. One swallow doesn't make a summer; it would be rash from a single beetle on a burnt stump to argue a new species of *Chrysomela* owing its brilliant complexion to a diet of charcoal. The neighbouring alders had not yet leafed out, but I searched their stems and branches carefully for over an hour and felt fully repaid by the result: four captures and one escape of the same chestnut-crimson *Chrysomela;* besides a dozen specimens of a beetle new to me so far except in cabinets *Lina lapponica* (*interrupta*); both insects evidently hibernated freely.

Towards the end of May, when the foliage was all out, I tramped along the railway track to the east end of this place and spent most of the sunny hours of one Saturday roaming about the clearing. As I approached I could hear a man driving hardwood pickets into soggy ground in the heart of the swamp. The sound went on all day (just west of the clearing) at regular intervals. But in the clearing itself such abundance and variety of leaf-eating beetles—especially *Chrysomelas*—I have never met with. If *Chrysomela* means golden sheep, then this certainly was the enchanted land of Colchis, for golden fleeces hung on every tree; and if the word means golden apple, here was every branch laden with gleaming fruit, a veritable garden of the Hesperides.

Was the dragon that guarded the fruit asleep, or was it that indefatigable laborer hammering stakes into the ground behind the alder thicket? What good was a fence, anyway, in the heart of such a swamp? When the sound of that incessant hammer kept up till long after six o'clock, my curiosity got the better of me, and, stealing through the cedars and poplars at the west end of the clearing, I soon found myself on the edge of the municipal ditch and only a few yards from the mysterious workman; he stopped as soon as he saw me, and, without any warning, rose into the air and flapped heavily away over the trees—a common bittern; ten minutes later he was driving piles into the bank of Lily Lake half a mile away.

When I came to check over the day's bag of Chrysomelids—a work whose successful completion was due to Dr. Bethune's kind help—it was something like this. On willow in the clearing I had taken about a dozen of *Chrysomela multipunctata*—var. *bigsbyana:* this form, with a dark thorax margined before and on the sides with pale cream, and having the sutural stripe dark, I have never taken on any other plant than the willow. On dogwood—out of the scores seen—I had taken 8 of *Chrysomela philadelphica:* this form I have always found on dogwood, and I have never taken any other species of *Chrysomela* on that shrub; the whole thorax is dark-bronzed (from green to black) and the elytra are without the sutural stripe, though the scutellum is marked with a dark spot. On spiræa I took two or three of what I thought to be this same form, but they proved on examination to be the variety

spiræ, in which the dark sutural stripe is present. On alder, I had found the handsome chestnut-crimson *Chrysomela* abundant, and had taken some fifty specimens: they are apparently a very robust form of *Chrysomela philadelphica*, as they lack the dark sutural stripe, and their other markings correspond. (*Chrysomela philadelphica* var. —shall we say *alni* or *Hesperidum?*). While hunting for this insect on the fringe of alders beside the municipal ditch, I discovered yet another *Chrysomela* and succeeded in making about fifteen captures: it was almost as large as the last, but the ground colour was white to pale cream, with heavily-marked and united sutural and sub-sutural lines; in short, it was *Chrysomela scalaris*, with a very slight difference—the apical or third pair of spurs were broken away from the sutural line and appeared as two detached spots; and the middle pair of spurs also tended to be irregular and broken. The normal form of *scalaris*, I had found once in great abundance in the larval stage on basswood near the Rideau Ferry and in the six or eight beetles that I reared through the pupal state, I remarked the same variation in the ladder-like series of projections to which the species owes its name. Each of these forms was abundantly distinct from all the others; I never saw any sign of interbreeding; each colony, each species and variety appeared to keep to itself. On the alders in this swamp there were, besides, thousands of *Lina interrupta* (*lapponica*); these were in all stages of *larvæ*, *pupæ* and *imagines*. In spite of its multitudes, and the short pupal interval between voracious grub and devouring beetle, the damage done to alder foliage seems trivial, due partly to the insect's small size and partly to the abundance of its food plant. Near the edge of the clearing I took two specimens of *Lina scripta*, feeding on willow; this beetle I have never found on any other plant than willow; those near Peterborough were all of the normal form, but often one or other of two varieties are to be found: in both of these the creamy ground-color of the elytra is replaced by a light-brown, and the elongated elytral spots are larger and only separated by narrow borders of the ground colour; in one variety these elongated spots are black; in the other, dark-brown; the former of these was sent me from Montreal, and I do not know its food plant; the other I found in abundance near Lindsay one season, feeding on willow. There

are four or five varietal forms illustrated by Blatchley (after Riley), but these do not include the forms I have just mentioned. Along the railway track, not far from this swamp, I took both species of *Crioceris* on plants of wild asparagus.

The genus *Chrysomela* has always been of great interest to me. I suppose because of its beauty, and, seeing in one of the books that the sub-species *rhoda* fed exclusively on hazel, I made a systematic search for the insect, but without any success. The only capture I have made on this plant is a species of *Balaninus* or nut-weevil, one of the wariest of insects; I have distinctly seen (and more than once) *Balaninus* swoon from the leaf it was resting on, while I was still several feet away; it invariably feeds in such a position as to drop into the tangled heart of the bush instead of falling exposed at the side. But the frequent occurrence of *Chrysomelæ scalaris* and *philadelphica* in varietal form on alder, coupled with their entire absence from hazel, rouses a suspicion. In size and habit, as well as character of foliage, the alder and the hazel are very similar, especially to a non-botanist: it would be interesting to get a consensus of opinion (or, rather, experience) in the matter from other field-collectors.

Another beetle, said by Blatchley to be beaten from hazel, is *Syneta ferruginea*. I had seldom seen this beetle (and never more than one at a time) till last season, but in testing out the alder as a food plant of *Chrysomelas* I took three or four pairs of *Syneta ferruginea* on leaves of alder near Bethany. The robust red-brown form of *Chr. philadelphica* I have now taken, two seasons running, and on alder, as far west of Peterborough as Mount Pleasant, and also two or three miles east of the city on the outskirts of my second hunting ground—Burnham's wood.

A NEW *PHANURUS* FROM THE UNITED STATES, WITH NOTES ON ALLIED SPECIES.

BY A. A. GIRAULT, GLENNDALE, MD.

1. **Phanurus opacus** Howard.

Both sexes are black; the thorax above is subglabrous.

2. **Phanurus floridanus** Ashmead.

The head and thorax are polished, the tibiæ and knees pale

brown; segments 1 and 2 of abdomen have very short striæ at base. The club is stouter than with *ovivorus*.

3. **Phanurus ovivorus** Ashmead.

The club is slenderer than in the preceding, the tibiæ dark, the thorax above showing faint reticulation cephalad, but mostly glabrous. The first two segments of the abdomen do not have striæ at base, or else these are extremely minute and short. In *flavipes* the vertex and scutum is uniformly finely reticulate. The species *ovivorus* is very close to *opacus*, if not identical.

4. **Phanurus emersoni,** new species.

Female—Length 0.90 mm. Black, the wings subhyaline, the venation pale dusky, the tarsi yellow. Differs from *opacus* Howard in that the male is varicoloured here. Differs from female *opacus*, *floridanus* and *ovivorus* in that the vertex and scutum are densely reticulated. Differs from *tabanivorus* in that the abdomen is only somewhat longer than the rest of the body, its third segment is not a fourth the length of the third, the thorax above is reticulated, and the male has the entire thorax honey yellow, also the antennæ (besides the legs and head as in *tabanivorus*). Closest (female) to *ovivorus*, which it resembles. Stigmal vein nearly twice longer than the marginal, about half the length of the postmarginal. Funicle 1 a half longer than wide, two-thirds the length of the pedicel, 2 a little shorter than 1, 3 still shorter, 4 globular, smallest; 5 cup-shaped, 6 the same, larger, wider than long; 7 and 8 subquadrate, 9 ovate, longer than wide. Short, distinct striæ at base of segment 2 of the abdomen.

In the male, funicles 1-3 are somewhat longer than in the female, while 4-9 are moniliform, wider than long, small; the club joint is ovate and as long as funicle 1 and stouter.

Described from a large number of both sexes reared from tabanid eggs at Dallas, Texas (F. C. Bishop).

Types—Catalogue *No. 19664*, U.S.N.M., 1♂, 8 ♀'s on two tags and a slide bearing 1 ♂, 4 ♀'s.

Types of *opacus*, *ovivorus*, *floridanus* and *flavipes* examined.

NEW GENERA AND SPECIES OF AUSTRALIAN MUSCOIDEA.

BY CHARLES H. T. TOWNSEND,
BUREAU OF ENTOMOLOGY, WASHINGTON, D. C.

The Muscoidea of all the principal regions of the earth have been catalogued, after a fashion, more or less completely, except those of Australia and Tasmania, which still stand without any published list whatever. The writer has recently prepared a complete synonymical catalogue of the Australian muscoid fauna, including that of Tasmania, in the course of which he has found it advisable to erect genera for certain described forms whose characters are sufficiently clearly recorded to allow of such action, credit being due to Brauer and Austen for elucidating the several types of Macquart and Walker concerned. These genera are presented in the present paper, together with descriptions of a few additional genera for new forms represented in the U. S. National Museum collection.

Paracalliphora, new genus.

Genotype, *Calliphora oceaniæ* R. D., 1830, Myod., 438, Port Jackson and Timor (Brazil in error).

Differs from *Musca* (Calliphora) as follows: Epistoma more produced, not so constricted by the vibrissal angles. Ocellar bristles wanting in male, weak or vestigial in female. Cheeks and front both averaging narrower. Scutellum with only two strong marginal pairs of macrochætæ besides the apical pair. Abdomen scarcely broader than the thorax, much less thickly hairy. (Nine specimens: 4, Sydney, H. Gurney; 2, Reedy Creek, N.S.W., maggots from sheep; 3, Australia, Koebele, No. 483).

Calliphora tibialis (1st) Mcq., 1846, Dipt. Exot. Suppl. I, 195, Tasmania and Australia, belongs to this genus. Brauer (Sitz. Ak. Wiss. CVIII, 524) says: "Gehört mit *M. stygia* F. zu *Pollenia villosa* R. D." This would seem to be wrong, as specimens mentioned below in U. S. N. M. coll. agree fairly with Macquart's description and are congeneric with *oceaniæ*. They bear a strong superficial resemblance to *villosa*, but lack the fulvous hair of abdomen. (Three spms.: Croydon, N. S. W., W. W. Froggatt).

Calliphora rufipes Mcq., 1843, Dipt. Exot. II (3), 286, Suppl. II, 99, Java and Tasmania, also appears to belong here, but I have no specimens and can only judge by comparing the description with material of *oceaniæ*, to which it seems extremely close. Brauer (Sitz. Ak. Wiss. CVIII, 526) says that it equals *Musca stygia* F. (*villosa* R. D.), but this seems doubtful since Macquart says "caerulea * * * abdomen bleu." It is also rather too small (6 mm.).

Tricyclopsis, new genus.

Genotype, *Rhynchomyia dubia* Mcq., 1855, Dipt. Exot. Suppl. V, 129-30, Adelaide. Brauer, Sitz. Ak. Wiss. CVIII, 514.

Near *Tricyclea* Wulp, but the third vein is bare. Facialia ciliate to above middle of face. Facial carina absent. Arista long-plumose above and below. Parafacials with short bristly hairs. Third antennal joint three or four times as long as second. Palpi clubshaped. Epistoma strongly produced. Antennæ two-thirds as long as face.

Gerotachina, new genus.

Genotype, *Tachina obtusa* Walker, 1856, Dipt. Saund., 274-5, New South Wales. Austen, Ann. Mag. N. H. ser. 7, XIX, 330-1 (Syn. *Echinomyia stolida* Wlk., 1858, Trans. Ent. Soc. London, n. s. IV, 195-6, male).

Differs from *Microtropesa* Mcq. as follows: Third antennal joint of female distinctly shorter than the second; that of male not longer than the second, or but slightly longer; in both sexes the third joint is convex on upper border. Arista short and stout. Row of six to eight small admedian spinelike macrochætæ on hind margin of second abdominal segment. Agrees with *Microtropesa* in all other characters given by Walker and Austen.

Tasmaniomyia, new genus.

Genotype, *Masicera viridiventris* (1st) Mcq., 1847, Dipt. Exot. Suppl. II, 84-5, Tasmania. Brauer, Sitz. Ak. Wiss. CVI, 336-7. (Syn. *Masicera viridiventris* 2d Mcq., 1851, Dipt. Exot. Suppl. IV (2), 163-4, female, locality Egypt in error).

Differs from *Microtropesa* Mcq. as follows: Parafacials bare, only with some hairs above. Facial carina narrow, sunken, not easily visible from in front. No ocellar bristles. Male claws long and slender, female claws short. Vertex in female as wide as one eye, in male narrower. Several rows of bristles on parafrontals in both sexes, but orbitals apparently absent in female as well as male. Abdomen of female flattened and pointed, that of male more oval; male hypopygium small, not directed forward. Front prominent, face receding, epistoma not prominent. Third antennal joint over twice to three times as long as second. Hind cross-vein sinuate, at two-thirds distance between small cross-vein and cubitus.

Acephana, new genus.

Genotype, *Masicera rubrifrons* Mcq., 1847, Dipt. Exot. Suppl. II, 85, Tasmania. Brauer, Sitz. Ak. Wiss. CVI, 339-40.

Differs from *Microtropesa* Mcq. as follows: Eyes hairy. Abdominal macrochætæ weak. Vibrissal angles somewhat convergent. Third antennal joint pointed on upper apical corner, like that of *Acemyia*. No ocellars. Female with two orbitals, and two verticals. Differs from *Goniophana* (equals *Tritaxys* Mcq.) in the hind tibiæ not ciliate; and from *Gædiophana* in the short second aristal joint. Epistoma not very prominent. Arista thickened to middle Hind cross-vein sinuate, at two-thirds distance between the small cross-vein and bend of fourth.

Opsophana, new genus.

Genotype, *Masicera rufifacies* Mcq., 1847, Dipt. Exot. Suppl. II, 87, Tasmania. Brauer, Sitz. Ak. Wiss. CVI, 340.

Differs from *Microtropesa* Mcq. as follows: No ocellar bristles. Eyes thickly hairy. Hind tibiæ pectinate, with longer bristles below. Abdomen with only thin bristle-like macrochætæ. Male claws long. Epistoma much produced, the vibrissæ situated high above oral margin. Related to *Goniophana* and *Acephana*. Front of male narrow. Frontals not descending below base of antennæ. Third antennal joint about four times as long as the second. Apical cell ending near wing apex.

Chlorodexia, new genus.

Genotype, *Chlorodexia froggattii*, new species.

Differs from *Chlorotachina* Townsend (Proc. Biol. Soc. Washn. XXVIII, 21) as follows: Epistoma not nearly so produced, vibrissæ not farther above oral margin than length of second antennal joint. Cheeks wider in proportion to eye-height, ocellar and frontal bristles stronger. Pubescence of eyes longer. Cubitus well removed from hind margin of wing, with long and strong stump; hind cross-vein much nearer to cubitus. Abdominal macrochætæ longer and stronger, hairs of abdomen longer.

Chlorodexia froggattii, new species.

Length of body 11 mm.; of wing 11 mm. One male Merriwa, N. S. W. (W. W. Froggatt).

Metallic green, with a rather thick coat of silvery pollen over all. Facial plate and cheek grooves testaceous, the former with an ochre-gold pollen; frontalia dark brown, first two antennal joints dark rufous, third joint and arista brown, palpi dark brown. Parafrontals dull golden pollinose, extending to cheek grooves. Cheeks, occiput, thorax, scutellum and abdomen deep metallic green, more or less thickly pollinose, four heavy blackish vittæ on mesoscutum, abdomen showing more distinctly bright green, venter and pleuræ with less pollen. Legs dark brown, the femora blackish. Wings nearly clear, tegulæ tawny whitish.

Holotype—No. 19971 U. S. N. M.

Named in honour of Mr. W. W. Froggatt.

Protomiltogramma, new genus.

Genotype, *Protomiltogramma cincta*, new species.

Differs from *Miltogramma* as follows: Form more elongate, subcylindrical, the abdomen subconical. Vibrissæ strong, decussate, well differentiated from the peristomal bristles. Third antennal joint elongate, nearly three times as long as second. Cheeks of female about as wide as margin of epistoma, those of male much narrower. Scutellum enlarged, elongate and broad, especially so in female, with about five or six marginal pairs of macrochætæ besides the apical pair.

Protomiltogramma cincta, new species.

Length of body 7 to 10 mm.; of wing 5 to 6.5 mm. One male and one female, latter the larger; male from Hamilton, Upper North Pine, Queensland, Jany., 1890; female from Buderim Mt., Queensland, Dec., 1889 (Dept. of Mines and Agr.).

Face and cheeks luteous, with pale yellowish bloom; rather more silvery in male. Frontalia fulvous to fulvotestaceous, antennæ wholly light ochre-yellow, arista brown. Parafrontals golden. Thorax, pleuræ and scutellum with golden pollen, which is paler in front and on sides; the mesoscutum with three heavy brown vittæ plainly continued on scutellum. Abdomen dark brown or blackish, the second to fourth segments evenly bordered anteriorly with rather broad band of silvery, which may have a faint golden lustre. Legs black, femora pollinose on outside. Wings clear, tegulæ watery-white.

Holotype—No. 19972 U. S. N. M., female.

Froggattimyia, new genus.

Genotype, *Froggattimyia hirta*, new species.

Parafrontals and parafacials evenly covered with short black bristly hairs. Parafacials bulged, their planes not oblique but nearly transverse. Cheek grooves restricted. Cheeks of male swollen, one-half eye-height in width, evenly clothed with fine short black hairs; those of female with yellowish hairs. Female vertex a little less than width of one eye, that of male hardly over one-half eye-width. Female with two proclinate orbitals, male without. Ocellar bristles small. Front of male prominent; in profile, frontals descending only a little below base of antennæ face rather receding; facial plate elongate and narrow, only a little sunken, with rather sharp carina, vibrissæ situated well above oral margin, epistoma not prominent. Third antennal joint about two and one-half times second; palpi club-shaped. Apical pair of separated and strong scutellar bristles, and two lateral pairs. Abdominal macrochætæ vestigial in both sexes. Hind tibiæ very short-ciliate in both sexes. Apical cell ending well before wing tip, open; hind cross-vein sinuate, nearer to bend; latter rounded, without wrinkle or stump. Parafrontals slightly widening below.

where they are nearly as wide as facial depression. Frontalia broad in both sexes, narrowed posteriorly in male.

Named in honour of Mr. W. W. Froggatt.

Froggattimyia hirta, new species.

Length of body 7 to 10 mm.; of wing 6.75 to 8 mm. One male and one female, Mittagong, N. S. W., reared from sawfly larvae, Feby., 1902 (W. W. Froggatt). The smaller measurements are of the female, whose abdomen is flexed.

Cheeks, face and front pale golden; frontalia fulvous to rufous; antennæ fulvous, third joint brown on upper edge at least distally. Mesoscutum dark; with thin pollinose coat in male leaving five vittæ, the middle one linear; thick coat of ashy pollen in female, leaving four vittæ and a faint suggestion of fifth. Scutellum dull luteous. Abdomen brownish, broadly dull fulvorufous on sides from first to fourth segments in male, narrowly so on first to third segments in female, ashy pollinose on dark parts and yellowish pollinose on lighter parts. Legs luteous to fulvous, femora of male blackish on base. Wings nearly clear. Tegulæ pale yellowish to whitish.

Holotype—No. 19973 U. S. N. M., male.

Protomeigenia, new genus.

Genotype—*Protomeigenia aurea*, new species.

Differs from *Froggattimyia* as follows: Parafacials bare, with some short bristly hairs above near lowest frontals. Vertex of female fully as wide as one eye, that of male about two-thirds same. Frontalia rather wider, front more prominent, face more receding. Parafacials rather broader, not bulged, their planes oblique; facial plate distinctly more sunken. Scutellum with a weak decussate apical pair of bristles in both sexes, and three lateral pairs of stronger ones. Cheek grooves not so restricted. Cheeks not so swollen.

Protomeigenia aurea, new species.

Length of body 7 to 9 mm.; of wing 6.5 to 7.5 mm. One male and one female, Manilla, N. S. W., reared from sawfly larvae,

Jany. 10 and 13, 1902 (W. W. Froggatt). The female is the smaller and has the abdomen flexed.

Face, cheeks and front golden. Facial plate lighter, frontalia brownish-rufous. Antennæ bright rufous, the third joint blackish on upper edge and distally. Mesoscutum of both sexes with four vittæ, the inner pair linear. Scutellum fulvorufous. Abdomen of male with only the faintest suggestion of fulvous on sides, that of female without. Thorax and abdomen dark, quite thickly coated with silvery. Otherwise the colour description of preceding species applies exactly.

Holotype—No. 19974 U. S. N. M., male.

Austrophorocera, new genus.

Genotype, *Phorocera biserialis* Mcq., 1847, Dipt. Exot. Suppl. II, 89, Tasmania. Brauer, Sitz. Ak. Wiss. CVI, 347.

Allied to *Thrycolyga*. Facialia ciliate in two rows to base of antennæ. Apical scutellar bristles very fine, short, decussate. Male front rather broad, with two rows of bristles on each side. Frontals descending well below base of antennæ. Third antennal joint four times as long as the second, which is not elongate. Arista thickened on only basal half. Parafacials bare. Eyes hairy. No discal macrochætæ on intermediate segments of abdomen. Hind cross-vein sinuate, at two-thirds the distance between the small cross-vein and bend of fourth vein.

Pareupogona, new genus.

Genotype, *Masicera oblonga* Mcq., 1847, Dipt. Exot. Suppl. II, 86, Tasmania. Brauer, Sitz. Ak. Wiss. CVI, 338.

Runs to *Eupogona* in B.B.'s tables of Masiceratidæ, and to *Gædia* in their tables of Phoroceratidiæ. Differs from *Eupogona* as follows: Male only. Second and third abdominal segments with discal macrochætæ. Legs elongate. Scutellum with strong separated pair of apical macrochætæ. Differs from *Gædia* in the open apical cell, which is very narrow at the end. Four postsuturals. Ocellars long, fine, proclinate. Facialia double-ciliate half way up. Parafacials with some short bristly hairs. Frontals strong, descending to middle of face. Vertex moderately wide. Eyes bare. Second

aristal joint short. Male claws long. Male with row of delicate bristles outside the frontals, together with short bristly hairs. Apical cross-vein straight, cubitus without stump. Vertical bristles strong. First abdominal segment with marginal macrochaetæ. Costal spine small, third vein bristled only at base. Hind tibiæ not ciliate. Proboscis short and stout, palpi club-shaped. Third antennal joint of male enlarged, about three times as long as the second.

To this genus apparently belongs *Masicera simplex* Mcq., 1847, Dipt. Exot. Suppl. II, 87, Tasmania; Brauer, Sitz. Ak. Wiss CVI, 337. The characters agree well, except that the male vertex is considerably narrower.

Eurygastropsis, new genus.

Genotype, *Eurigaster tasmania* Walker, 1858, Trans. Ent. Soc. London, n. s. IV, 197, Tasmania, Austen, Ann. Mag. N. H. ser. 7, XIX. 331.

Allied to *Frontina*. Eyes and parafacials hairy. Ocellar bristles wanting. Epistoma very prominent. Macrochaetæ of abdomen only marginal. Male claws short. Male frontalia narrowed posteriorly. Frontal bristles descending one-third way down the face. Facialia ciliate practically their whole length. Antennæ reaching the epistoma, third joint six times as long as second. Arista thickened its whole length, hardly as long as third antennal joint. Cubitus obtuse, apical cross-vein slightly bent in, apical cell ending well before wing tip, hind cross-vein nearer to cubitus than to small cross-vein.

Mesembriomintho, new genus.

Genotype, *Mesembriomintho compressa*, new species.

Differs from *Mintho* as follows: Apical cell closed in margin, ending just before wing tip; cubitus close to hind margin of wing; costal spine atrophied. Front of male at vertex hardly over one-third width of one eye, that of female about one-half eye-width. Facialia bare. Arista plumose. Frontal bristles not descending below base of antennæ. Abdomen strongly compressed laterally

in both sexes. No median macrochætæ on first abdominal segment. Front claws of male longer than others.

Mesembriomintho compressa, new species.

Length of body 6.75 to 8.5 mm.; of wing 5.25 to 6.75 mm. One male and one female, Hamilton, Upper North Pine, Queensland, Jany. 1890 (Dept. of Mines and Agriculture). The female is the smaller.

Black, silvery pollinose. Frontalia and first two antennal joints dark brown; third joint dusky, with a silvery bloom. Palpi fulvous, obscurely infuscate basally in female. Thorax silvery; with four linear vittæ, the middle ones stopping at suture; the outer ones obliterated anteriorly by a heavy broad vitta on each side, the two being confluent on anterior edge of thorax. Scutellum blackish. First abdominal segment, apical half of second and more than apical half of third shining black, not pollinose; rest of abdomen silvery-white pollinose. Legs blackish; femora brownish, silvery on outside, especially front pair. Wings lightly yellowish-smoky. Tegulæ watery-whitish.

Holotype—No. 19975 U. S. N. M., male.

Parabrachelia, new genus.

Genotype, *Masicera rufipes* Mcq., 1847, Dipt. Exot. Suppl. II, 86, Tasmania. Brauer, Sitz. Ak. Wiss. CVI, 339.

Differs from *Brachelia* as follows: Male only. Cheeks broad. Proboscis short, palpi slender. Apical cell closed in margin, cubitus without stump. Hind tibiæ not ciliate. Parafacials broad, bare. Ocellars present, proclinate. Male claws elongate. Abdominal macrochætæ discal and marginal. Apical cross-vein straight. Eyes thickly hairy. Epistoma prominently produced. Apical scutellar bristles erect, delicate, not decussate; the laterals very long and strong. Vertical bristles present. Second aristal joint short. First abdominal segment shortened, hypopygium small. Frontal bristles descending one-third way down the face. Third antennal joint three times the second, which is not elongate. Hind cross-vein only a little nearer to cubitus than to small cross-vein.

Austrophryno, new genus.

Genotype, *Tachina densa* Walker, 1856, Dipt. Saund., 288-9, New South Wales. Austen, Ann. Mag. N. H. ser. 7, XIX, 331 (Syn. *Tachina hebes* Wlk., l.c. 289, male, Tasmania).

Allied to *Phryno*. Facialia ciliate on lower one-third. Cheeks one-third eye-height. Antennæ inserted above eye-middle. Face broad. Frontal bristles descending to base of arista, with some small bristles below. Abdominal macrochaetæ only marginal. Epistoma only slightly prominent. Eyes hairy. Frontalia narrow. Antennæ about as long as face; the third joint slender in female and less than three times the second, in male about three times second. Arista much longer than third antennal joint, thickened at base. Cubitus hardly obtuse, apical cross-vein slightly bent in at base, hind cross-vein more or less bent inward.

Tracheomyia, new genus.

Genotype, *Oestrus macropi* Froggatt, 1913, Agric. Gazette N. S. W., July 2, 1913, pp. 567-8, pl. (5 figs.). Moramana Station, Walgett District, Australia. Maggot lives in the *windpipe* of the kangaroo. Fly unknown.

This appears to be an endemic Australian œstrid, and is the first one known. Its existence is thus of the greatest interest from the biogeographical point of view, as well as with relation to the phylogeny of muscoid stocks. The particular combination of larval characters is unique, as may be seen from the description and figures. The larval habitat in the host is likewise unique. The host itself is distinctively Australian. All these facts argue for the marked distinctness of the fly. The small boss of the anal stigmatic plates described by Froggatt would seem to be the false stigmatic opening or so-called button, and can hardly contain the spiracles which should lie outside the button in the field of the plates. It appears that the anal stigmata much resemble those of *Œstrus ovis*, but the armature is very distinct and approaches that of certain tachinids. Evidently this maggot does not belong to any of the described genera of Australian flies. It may be allied to *Pharyngomyia* or *Pharyngobolus*, judging from larval habit, but on larval characters it is nearer to *Œstrus* than to either of the genera named.

THE HEATH COLLECTION OF LEPIDOPTERA.

BY F. H. WOLLEY DOD, MIDNAPORE, ALTA.

The collection of Lepidoptera formed by the late E. Firmstone Heath, of Cartwright, Manitoba, was, shortly after his death, acquired by the Manitoba Government. Mr. J. B. Wallis, of Winnipeg, was asked to overhaul it and put it into condition for museum reference, as it was intended that it should form the nucleus of the entomological section of the Provincial Museum. Shortly before Christmas Mr. Wallis very kindly wrote offering me the opportunity of looking through it, a chance of which I was most ready to avail myself. Accordingly, in the last week of the old year, I visited him at his rooms on Boyd Avenue, where the collection had been temporarily deposited, and together we spent four or five days studying it, sorting out the mixtures, and making a full list of the species as far as we were able to identify them. Such species as we were uncertain about, or had no means of verifying, were subsequently sent east to experts in the various families. The Hydrœcias and Papaipemas went to Mr. Bird, Geometrinæ and Hepialidæ went to Mr. A. F. Winn, Drs. Barnes and McDunnough, the Catocalas and Deltoids to Mr. Arthur Gibson and Drs. Barnes and McDunnough, and the Micros to Mr. Busck. A number of species in all families were submitted to Messrs. Barnes and McDunnough. The assistance of all these gentlemen is most gratefully acknowledged.

Viewed as a whole, the collection was in poor condition. The percentage of worn or indifferent specimens was high, and, with a very few exceptions, the setting was badly done on short pins. Nearly all of those on long pins were from other collections. A portion, none too large a portion either, of the specimens bore date labels, usually face downwards; though so very low was the setting that the specimens had in any case to be removed whenever it was desired to read them. The authority for an identification was very rarely given, and even when given, was written on a label below a series, and never attached to the actual specimen or specimens named by a recognised authority. Some specimens

bore numbers, probably indicating that they or their duplicates had been submitted to an expert, and it may be possible in some cases to make guesses at associating these specimens with similar numbers amongst the numerous notes and correspondence pertaining to the collection, but which we did not then have time to look through. I cannot recall that we found one single instance in which a Cartwright label was attached to a specimen. But, as I believe Heath to have collected at Cartwright exclusively for about 35 years, we decided that it would be reasonable to assume any specimen to be of Cartwright origin unless any other locality or collector's name was pinned below it, as, for instance, I found was always the case with specimens which I had sent him myself. Heath, though a most energetic collector and ardent lover of nature, had, unfortunately, a poorly developed faculty for recognising a species. I had long previously discovered this from correspondence and exchange of specimens with him, though, as a matter of fact, he cared little for specimens not from Cartwright, and so rarely accepted in exchange. During Smith's lifetime, Heath had relied almost exclusively upon him for names in the Noctuidæ, and very rarely, either openly or privately, disputed a name that was given him. Now, Smith's determinations for corresponding collectors were very frequently, to say the least of it, hasty, and very often, alas, culpably careless. In my own experience, in my earlier collecting days in the west, I not infrequently found that if I sent Smith specimens of a species—it might be of a well known and not very variable species either—twice or three times, he would apply a different and very distinct name to it each time. Heath evidently met with this trouble, and got over the difficulty by dividing a species, not always very variable, into two or three. We frequently found a series of good or tolerably good specimens standing as one species, and a series of bad specimens of the same as distinct. And perhaps a series of smaller specimens of the same thing as something else, such as "probably new J.B.S." Nor was that all. Besides the frequency with which one species stood for two or more, it was deplorable the number of very distinct and often dissimilar species which were arranged in one series under the same name. In short, the errors and mixtures were appalling.

A few instances of the confusions and mixtures may be interesting. Heath had two female co-types of *Hadena miniota* Smith, described from Miniota and Cartwright. When I saw Smith's types at Rutger's College, I recognised in them a form I have been taking at Calgary for twenty years simultaneously with, and apparently grading into, typical *versuta*, and thereafter in my notes in the "Canadian Entomologist" referred *miniota* as a colour-form of that species. (I have recently had good reason to doubt the correctness of that reference, but that is beside the point at present.) Heath wrote and remonstrated, saying that the two were entirely different and could not be confused. I assumed that he had misidentified *miniota*, and told him so. He thereupon showed me a co-type, which I returned with the remark that it merely confirmed my conviction. When I viewed the collection with Mr. Wallis, the mystery was solved. A short series of *miniota*, including two co-types, stood under *versuta*, which label had been surcharged upon a *miniota* label presumably, as per my dictum. But the surprise stood next to it. A long series, two columns or more, containing two or three *miniota*, and one or two other species, but principally *devastatrix*, stood also as *versuta*. That such a series should have been pronounced to be "quite distinct from *miniota*" was of course intelligible. But the complication did not end there, for in another box a series of *devastatrix* stood, pure, under its correct name.

Caradrina rufostriga stood in a series under its correct synonym of *punctivena*. Elsewhere in the collection it did duty as *Hadena indirecta*. *Noctua clandestina* stood correctly named, and also as *Amphipyra tragopoginis*. *Peridroma occulta* ditto, and as *Polia pulverulenta*. Four *Agroperina lutosa* and one *Scopelosoma sidus* stood as *lutosa*, and another series of *lutosa* as *Euxoa scandens*. One *scandens* stood as *Porosagrotis vetusta*. *Scandens* and *lutosa* were two speceis found scattered abroad throughout the collection. Another species badly mixed up with many others, particularly with *Orthosia dusca*, was *Parastichtis discivaria*, and one badly worn specimen of it stood as the sole representative of *Hadena semicana*. *Mamestra neoterica* was arranged in two series, one as *goodellii*, another as *acutermina*. *Acutermina* itself did duty for *neoterica*, and two specimens of it stood apart under "*Noctua*,

not identified by Smith"! *Mamestra grandis* did duty both for its own self, and for *legitima*. Four specimens stood under *Mamestra incurva*, two of them being *larissa* and two *vicina*. *Cleoceris curvifascia*, was *Hillia algens*, which also stood correctly. *Orthosia inops* and *Erastria panatela* stood together as *Tapinostola variana*, and *inops*, another rather widely scattered species, stood correctly named as well. One *Cucullia intermedia* stood as *Rancora albicinerea*, of which species two specimens stood together in the collection under no name.

I have mentioned only a few of the principal mixtures and misidentifications. I shall refer to others amongst the list of species to follow. These I think will serve to show that records published by Heath must be treated as wholly unreliable. They may also in some instances serve as a clue as to what species may have been intended by some of his published names. But, whilst that should be thoroughly borne in mind, the fact must not be lost sight of that the late Mr. Heath did a very great deal for western entomology, and his collection, which he spent so many years in accumulating, and which gave him so much pleasure in life, forms a very valuable basis on which Manitoba students may found a list of species occurring in that province. Would that such workers were more numerous.

The following list comprises only those species which are believed to have been taken by Heath at Cartwright. The order and nomenclature followed is, with certain necessary exceptions, that of Smith's 1903 Check List. In some instances amongst the Noctuidæ, where the generic names adopted by Sir George Hampson are at least fairly well known changes, I use those, adding the older ones in brackets. The time will probably not be long before a new general Check List will be published, in which the order and genera used by Hampson will be largely adopted.

RHOPALOCERA.

Nymphalidæ.

Dánais plexippus Linn.
Euptoieta claudia Cram.
Argynnis cybele Fabr.

Argynnis aphrodite Fabr. One female without label. Apparently typical, and agreeing with a female in the collection labeled Jefferson, N. Y.

Argynnis lais Edw. Very pale and near *cypris*.

Argynnis atlantis Edw. One male without label. Typical. I was surprised to see this form from Manitoba. Mr. Wallis has taken it quite commonly at Winnipeg Beach.

Argynnis nevadensis Edw. var. *meadii* Edw. Standing as *edwardsii*, by which form it used to be known in the west.

Argynnis myrina Cram.

Argynnis freija Thunb.

Argynnis bellona Fabr.

Phyciodes nycteis Db.-Hew. And two large females erroneously as *hanhami* Fletcher.

Phyciodes ismeria Bd.-Lec.

Phyciodes tharos Dru.

Grapta interrogationis Fabr. vars. *fabricii* Edw. and *umbrosa* Lint.

Grapta comma Harr. vars. *harrisii* Edw. and *dryas* Edw.

Grapta satyrus Edw.

Grapta faunus Edw.

Grapta progne Cram.

Grapta j-album Bd.-Lec.

Vanessa antiopa Linn.

Vanessa californica Bdv.

Vanessa milberti Godt.

Pyrameis atalanta Linn.

Pyrameis huntera Fabr.

Pyrameis cardui Linn.

Limenitis arthemis Dru.

Limenitis archippus Cram.

Debis portlandia Fabr.

Neonympha canthus Bd.-Lec.

Neonympha eurytis Fabr.

Cœnonympha typhon Rott. var. *laidon* Borkh. Dr. McDunnough says that in his opinion this is *inornata* Edws., and that there is no justification in sinking *inornata* as a synonym.

Erebia discoidalis Kirby.

Satyrus alope Fabr. vars. *nephele* Kirby and *olymphus* Edw.

Chionobas varuna Edw.

LYCÆNIDÆ.

Thecla acadica Edw.

Thecla calanus Hbn.

Thecla liparops Bd.-Lec.

Thecla augustus Kirby.

Thecla titus Fabr.

Thecla heathii Fletcher. There were no specimens under this name in the collection. The species was described in 1903 from a single female taken by Mr. Heath at Cartwright, about twenty-five years previously. As Dr. Skinner has suggested, it may prove to be an aberration.

Chrysophanus thoe Bdv.

Chrysophanus helloides Bdv.

Lycæna sæpiolus Bdv.

Lycæna afra Edw. The form stood as *couperii* Grt., but Mr. Wallis tells me that it is now called *afra* (teste, Dr. Skinner).

Lycæna rustica Edw. One female standing as *aquilo*. On comparison with Calgary material the specimen appears to be normal female *rustica*.

Lycæna melissa Edw.

Lycæna pseudargiolus Bd.-Lec. and vars. *lucia* Kirby and *neglecta* Edw.

Lycæna amyntula Bdv. Heath appeared to have separated two series as *amyntula* and *comyntas*, but the separation did not seem justified.

PAPILIONIDÆ.

Pieris protodice Bd.-Lec.

Pieris napi Linn. var. *oleracea-æstiva* Harr.

Pieris rapæ Linn.

Nathalis iole Bdv.

Colias cæsonia Stoll.

Colias eurytheme Bdv.

Colias eriphyle Edw.

Colias philodice Godt. According to specimens named for Mr. Wallis by Dr. Skinner, *eriphyle* and *philodice* fly in Manitoba, and are distinguishable, and both are in the Heath collection. He calls those with secondaries yellow beneath *eriphyle*, and those green *philodice*. The green appearance, by the way, is really the effect of an admixture of black scales upon a pale lemon ground. If that diagnosis is right, then I have two species mixed at Calgary, but must admit my inability to draw a line between them. Moreover, all my *philodice* from the eastern states have most distinctly yellow undersides to the secondaries.

Papilio polyxenes Fabr.

Papilio glaucus Linn. var. *turnus* Linn.

HESPERIIDÆ.

Carterocephalus palæmon Pall.

Thymelicus garita Reak.

Pamphila hobomok Harr.

Pamphila comma Linn var. *manitoba* Scudder. Females only stood under the name, but males of this form stood under *mystic*.

Pamphila peckius Kirby.

Pamphila mystic Scudd. Three females, much worn.

Pamphila cernes Bd.-Lec.

Pamphila metacomet Harr.

Amblyscirtes vialis Edw.

Pyrgus tessellata Scudd. Probably the form named *occidentalis* by Skinner in Ent. News, XVII, 96, March, 1906, and figured on plate XIII, October, of the same year.

Nisoniades brizo Bd.-Lec.

Nisoniades icelus Lint.

Nisoniades juvenalis Fabr.

Eudamus pylades Scudd.

Eudamus tityrus Fabr.

(TO BE CONTINUED)

A FEW OBSERVATIONS ON THE APPLE MAGGOT PARASITE—BIOSTERES RHAGOLETIS, RICHMOND.

BY C. A. GOOD, TRURO, NOVA SCOTIA.

In the September number (1915) of the Canadian Entomologist appeared an article written by Mr. W. C. Woods of Orono, Maine, in which he discussed the presence of the new apple maggot parasite, *Biosteres rhagoletis*. As he had not seen the insect at work, the following short account should be interesting since it throws some light upon the manner in which the maggots are parasitized.

In August of this year, while observing the oviposition habits of the apple maggot near Digby, Nova Scotia, my attention was drawn to several small, brownish insects which were flying about the leaves. Presently one of them alighted upon an apple, and after slowly crawling over it in an erratic fashion for a few minutes, it raised itself high on its legs and began prodding the skin of the apple with its ovipositor. Previously this instrument had been stretched out behind the abdomen in a horizontal position, but it was now bent under it, and down in a vertical manner. First using the two heavier and outer pairs of the ovipositor to pierce the skin, they were eventually raised up slightly while the lighter-coloured, more slender egg-tube was plunged into the apple to a depth of about one-quarter of an inch. After a pause of a few seconds the whole was withdrawn and the insect moved to a new spot, recommencing the operation at once. Five punctures were made in rapid succession before I caught it. This insect was later determined by Mr. E. A. Richmond, of Cornell University, as *Biosteres rhagoletis*.

Thus it appears that this parasite is a larval one, and this, no doubt, accounts for the high percentage of mortality among the larvæ and pupæ of the apple maggot.

APHIDIDÆ FOUND ON THE APPLE IN BRITAIN AND THE DESCRIPTION OF A NEW SPECIES FROM AFRICA.

BY FRED V. THEOBALD, M.A.

Aphididæ Found on the Apple in Britain.

No less than eight species of Plant Lice or Aphididæ have been found at different times on the apple in Great Britain. The following are the species I have examined:—

1. *Aphis pomi* De Geer.
2. *Aphis kochii* Schonteden.
3. *Aphis cratægi* Kaltenbach.
4. *Aphis nigra* nov. nom (*oxyacanthæ* Koch).
5. *Aphis rumicis* Fabricius.
6. *Siphocoryne avenæ* Fabricius.
7. *Phorodon humuli* Schrank.
8. *Eriosoma lanigera* Haussman.

Of these, four species are common, namely, *Aphis pomi*, *Aphis kochii*, *Siphocoryne avenæ* and *Eriosoma lanigera*.

Of the others, I have several times received or found Kaltenbach's *Aphis cratægi*, which must not be confounded with the Aphis of that name redescribed by Buckton in his Monograph of British Aphides,* which is a totally distinct insect—green, not black! *Aphis rumicis* was sent me once from apples in 1900, and in 1904 I found many on some "Maiden" apples, undoubtedly "casuals" in both cases. Nevertheless this Aphid was reproducing on the fruit trees.

Aphis oxyacanthæ Koch (non Schrank) has been sent me once from Berkshire.†

Phorodon humuli, the Hop-Damson Aphis, was found in 1911 breeding on a few apple trees at Wye in considerable numbers. The chief object of this paper is to show that the most harmful of all apple-leaf and shoot-feeding "Plant Lice" in Great Britain is Koch's *Aphis pyri*, renamed by Schonteden *Aphis kochii* (for reasons afterwards given), and not as has been stated here and in America, Kaltenbach's *Aphis sorbi*, which was described from specimens found on *Sorbus aucuparia*, a totally distinct species.

*Vol. 11, p. 35, pl. XLVII, figs. 1-3, 1877.
†This I have renamed *Aphis nigra*.

It was only through receiving some apterae from that tree sent by Mr. Britten, from Cumberland, that I discovered this general mistake.

That the so-called Brown, Blue and Rosy Aphis or Leaf-curling Aphis of the apple in England was not *Aphis sorbi* was at once seen, for Kaltenbach* clearly stated that the cornicles of the apterous ♀ were "*blassgelb*, an der Spitze bräunlich," whilst the erroneously called *Aphis sorbi* has them markedly *black* in all stages.

Probably the presence of the four pre-anal papillæ in both species led Sanderson and others to the conclusion that they were the same. Very similar papillæ, I find, also occur in Kaltenbach's *Aphis cratægi*.

I have not attempted to deal with all the known features of the life histories of these insects, nor the full bibliography, but merely point out their proper names and the salient features of their bionomics as observed in Britain and the literature examined.

The Woolly Aphis (*Eriosoma lanigera*) is not dealt with, however, as I am preparing a special report on this insect in regard to its life in Britain. Several other species have been found on the apple in America; only one of these, so far, is known in Europe, namely, Koch's *Aphis mediaginis*, which I have found in England, but which, up to now, has not been noticed on the apple. These are referred to in a note at the end of this paper. I also add the description of an undescribed Apple Aphis from Africa.

SYNONYMIC LIST OF BRITISH APHIDIDÆ FOUND ON THE APPLE.

1. **Aphis pomi** De Geer.

Aphis mali Fabricius.
Aphis pyri-Kittel (non Boyer, Koch).
Aphis padi Sanderson (non Linnæus).
Aphis oxyacanthæ Schrank.

2. **Aphis kochii** Schonteden.

Aphis pyri Koch (non Boyer).
Aphis pyri-mali Fabricius (part).
Aphis mali Buckton (part), Britton.

*Mono. Pflanzenlause, 1, p. 70, 1843.

Aphis sorbi Walker (part), Sanderson, Theobald, etc., (non Kaltenbach).

Myzus mali Ferrari (part).

**Aphis malifoliæ* Fitch.

3. **Aphis cratægi** Kaltenbach (non Buckton).

4. **Aphis nigra,** nov. nom.

Aphis oxyacanthæ Koch (non Schrank).

5. **Aphis rumicis** Linnæus.

Aphis papaveris Fabricius.
Aphis thlaspeos Schrank.
Aphis fabæ Scopoli.
Aphis atriplicis Fabricius.
Aphis aparines Schrank.
Aphis armata Haussman.
Aphis dahliæ Mosley.
Aphis atriplicis Buckton.
Aphis evonymi Fabricius.
Aphis ulicis Fabricius.
Rumicifex Amyot.
Meconaphis Amyot.

6. **Siphocoryne avenæ** Fabricius.

Aphis avenæ Fabricius.
Aphis avenæ sativæ Schrank.
Aphis annuæ Oestlund.
Aphis mali Fitch (non Fabricius).
Aphis fitchii Sanderson.
Aphis cratægifoliæ Fitch.†

7. **Phorodon humuli** Schrank-Koch.

Aphis humuli Schrank.
Aphis pruni Scopoli.

*Schonteden places this as a synonym of De Geer's *Aphis pomi*. It is certainly not so.

†Schonteden gives Fitch's *Aphis prunifoliæ* as a synonym. It is not, for this is clearly only *Aphis pruni*.

8. **Eriosoma lanigera** Haussman.

Aphis lanigera Haussman.
Eriosoma mali Somonelle.
Myzoxylus mali Blot.
Schizoneura lanigera Kaltenbach.
Pemphigus pyri Fitch.

TABLE OF SPECIES:

Alate viviparous females

I. Cornicles present.
A. Abdomen green, with black lateral spots, etc.
B. Head and base of antennæ without marked processes. Cornicles long, cylindrical, black. Antennæ with 7-8 sensoria on segment 3 and 2 to 4 on segment 4.....*pomi* 1
Cornicles moderately long, black, slightly swollen at base.
Antennæ with 5-6 sensoria on 3 in a line, none on 4.....*pomonella* 2
Cornicles rather short, pale brown to green, constricted at base and apex.
Sensoria on segments 3, 4 and 5.....*avenæ* 3
BB. Head and base of antennæ with marked processes.....*humuli* 4
AA. Abdomen dark. Black, brownish-black, deep olive-green, with 5 blacker lateral spots and bars, rather shiny.....*rumicis* 5
Unknown.....*nigra* 6
AAA. Abdomen reddish and black.....*kochii* 7
AAAA. Abdomen black white at base.....*cratægi* 8
II. No cornicles.....*lanigera* 9

Apterous viviparous females.

I. Cornicles present.
A. Green, not mealy.
B. Cornicles long, cylindrical, black.....*pomi* 1
BB. Cornicles shortish, brown and green, constricted at base and apex.....*avenæ* 2
BBB. Cornicles long, thin, green.....*humuli* 3

AA. Blue-black, slaty or pink, cornicles black, globose and mealy.....*kochii* 4

AAA. Black.

B. Somewhat flattened; mealy.....*cratægi* 5

BB. Globose; somewhat mealy; often with white flecks.....*rumicis* 6

BBB. Globose; not mealy; all legs black.....*nigra* 7

II. No cornicles.....*lanigera* 8

Aphis pomi, De Geer.

Aphis mali Fabricius (non Oestlund, etc.).

Aphis oxyacanthæ Schrank (non Koch).

Aphis padi Sanderson (non Linnæus).

Aphis pyri Kittel (non Boyer, Koch, etc.).

De Geer, Mems. III, p. 53, pl. III, figs. 18-21, 1773.

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Theobald, Rept. Eco. Zool. 1911, p. 34, 1912.
Tullgren, Upp. Prak Ent. XXII, p. 65 (pomi), 1913.
Carpenter, Eco. Pro. R. Dublin Soc. II, No. 6 (pomi and sorbi), 1913.
Theobald, Bull. Ent. Res. IV, p. 323, 1914.
Patch, Bull. 233, Maine Agri. Exp. Sta., p. 267, 1914.

Note.—Oestlund says Dr. Fitch's *Aphis malifoliæ* appears to be a variety of *Aphis mali* Fabricius, Schonteden, etc., and thinks it is the same as *Aphis pomi* De Geer; that is *mali* of Fabricius. I think it may be *kochii;* it is certainly not *pomi*.

DESCRIPTION:

Alate viviparous female.

Head and thorax black. Abdomen green; cornicles straight, black, imbricated. Antennæ shorter than body; 3rd segment with 6-10 sensoria; 4th with 2-4 sensoria; 3rd longer than 4th, 4th longer than 5th, 3rd to 6th imbricated. Cauda black, blunt, with 4 to 5 pairs of lateral hairs. On the green abdomen are four pairs of lateral black spots, and from each arises a blunt projecting tubercle, and another is present on the segment carrying the cornicles, smaller than the preceding but marked; the 7th and 8th segments may have blackish median basal patches. Legs green; apices of femora and tibiæ dark; tarsi dark. Wings with yellowish-green insertions. *Length* 2.0 to 2.5 mm.

Apterous viviparous female:

Bright green to rich yellow green; cornicles markedly black, slightly tapering, thick and rather long. Cauda blackish to deep brown. Antennæ not quite as long as the body; 3rd to 6th segments imbricated; 3rd longer than 4th, 4th very slightly longer

than the 5th. Legs green; apices of femora and tibiæ and the tarsi black.

Length 1.5 to 2 mm.

Oviparous female:

Apterous. Green to dull yellow, often mottled; head brownish. Cornicles black, straight, imbricated. Cauda black. Antennæ not as long as body, of 6 segments, basal one larger than the 2nd, 3rd, 4th and 5th nearly equal in length; 6th about as long as 4th and 5th; the 5th and 6th dark; also the 1st and 2nd, remainder green; imbricated, especially apically. The junction of the 3rd and 4th often indistinct. Eyes large, dark. Proboscis reaching past the 2nd pair of legs, acuminate. Pronotum with a large green papilla on each side; abdomen with a large papilla on each side before hind legs and 3 smaller ones between them and the cornicles; sometimes yellowish laterally; also with a few hairs. Cornicles thick, black, cylindrical, slightly expanding basally, imbricated, longer than segment 3 of the antennæ. Cauda prominent, dark and very spinose, with 5-6 pairs of lateral hairs curved apically and a median dorsal apical one. Anal plate dark. Legs with dark femora, except just at their base; tibiæ pale, dark at the apex; tarsi dark; hind tibiæ with a few pores (2-6), or trace of sensoria*; genitalia dark.

Length 1 to 1.5 mm.

Male:

Apterous, dull yellowish-brown, yellowish-green to green. Antennæ of 6 segments, not quite as long to slightly longer than the body; 1st segment wider than the 2nd, but no longer; 3rd as long as the 4th; 4th slightly longer or the same length as the 5th; 6th about as long as the 4th and 5th; in a few I have noticed a single sensorium on the 4th; edges markedly serrated. Eyes large, black. Cornicles black, cylindrical, slightly expanding at the base; not quite as long as segment 3 of the antennæ. Femora and tibiæ dull green to deep brown, except the apex of the latter; tarsi dark. Cauda black, spinose, with several long lateral hairs bent at their tips. Genitalia black. Penis yellowish.

Length .8 to 1.0 mm.

*Gillett says 10 oval sensoria on hind tibiæ.

Food Plants—Apple, Pear, *Cotoneaster vulgaris*, *Cydonia spp.*, *Mespilus germanicus*, *Crataegus oxyacanthæ*, *C. monogyna*. It has also been referred to on *Sorbus aucuparia*, *S. domesticus*, and *S. torminalis*. Macchiati gives *Mespilus japonica* and *Ailantus glandulosa* (p. 255).

Distribution.—All over Britain and Europe generally, America, South Africa. The only African records are Dewar's (1905) and are by Lounsbury, who found the ova on imported stock. Tasmania (Lea).

Notes on Life-history.

The Green Apple Aphis occurs every year on apples and pears in Britain, often in considerable numbers, but never in such vast swarms as does the following species. Moreover the damage caused by it is not nearly so severe as that done by *Aphis kochii*. It mainly lives on the top shoots and beneath the leaves; sometimes it is densely packed together; at others in scattered groups. The curling of the foliage is not nearly so severe as in attacks of *Aphis kochii*. This green "Dolphin" hatches out from mid-April to early in May; that is somewhat later than in the following species. It increases very slowly at first, but in June it may spread very rapidly, and on into July, when the tops of the trees may become covered with it. The earliest alate females I have found were towards the end of June, and these may continue to appear erratically on into August and fly from the apple and pear to other trees close by. In October the sexual forms occur, namely, apterous, oviparous females and apterous males. These often swarm in October and November under the leaves, where copulation takes place. When fertilized, the females crowd on to the shoots and there deposit their ova, usually great numbers together, so that nothing of the shoots can be seen. At first the ova are yellowish-green to dull yellow; in a few days they become black and shiny. There they remain all the winter. The males are very few in number. The whole life-cycle seems to be passed on the apple and pear, unlike *Aphis kochii* and *A. avenæ*.

Miss Patch also finds in America that it is not migratory, and is thus to be found at all seasons of the year upon apples in some form or other.

This species does comparatively little harm in Britain, although

it often occurs in great abundance. On young nursery stock, however, I have seen it not only stunt the growth to a very great extent, but to actually kill the tender tips of the shoots. In America Miss Patch says that it is by far the most troublesome of the leaf aphides of the apple in Maine; contrary to what we notice in Britain. It can easily be dealt with by spraying, unlike our most troublesome Apple Aphis—*Aphis kochii*.

The hind tibiæ of the oviparous female are not swollen, as is usual, and bear but very few sensoria; in fact, in many I have been unable to find any pores at all.

(TO BE CONTINUED).

SOME 1915 NOTES ON A FEW COMMON JASSOIDEA IN THE CENTRAL MISSISSIPPI VALLEY STATES.

BY EDMUND H. GIBSON, U. S. BUREAU OF ENTOMOLOGY, WASHINGTON, D. C.

The past year has been especially favourable for jassid collecting in the Central Mississippi Valley, principally because of frequent rains favouring rank growth of native grasses and weeds, and an ever abundant supply of tender plant growth and foliage. The following notes are from observations made in western Illinois, Kentucky, Tennessee, eastern Missouri and Arkansas.

Dræculacephala mollipes Say was everywhere abundant from early spring until late fall. During the early summer it was very numerous in northern Arkansas, where it caused considerable injury to young corn. Great quantities were observed around electric lights in the heart of the city of St. Louis early in September. There is no doubt but that *D. mollipes* has a characteristic habit of long flights at night. This is one, if not the most general feeder of all the Jassoidea. However, oviposition seems to be confined principally to grains, grasses, and grass-like plants. This sharp-headed grain leafhopper was seldom taken in sweepings from the foliage of trees.

Diedrocephala versuta Say became abundant during the late summer. It was found to be of economic importance to cow-peas in Missouri, where occasional injury was noted to the tender growth of the vines. Alfalfa is the only other field crop upon which they were found abundant. Adults were collected from many ornamental

plants and shrubs growing in the Missouri Botanical Gardens at St. Louis. This species, the nymphs particularly, seem to be rather sluggish in their movements. They do not jump or run quickly, and it is quite easy to put one's finger on them.

Diedrocephala coccinea Say, one of the most handsome and striking forms, was taken wherever collections were made. While not found in such numbers as *D. mollipes* or *D. versuta*, yet they were observed feeding on a great variety of plants, including over 50 species of weeds, on many ornamental plants and shrubs, and various trees. It was the only species found to feed on the leaves of the American Holly. Many of their nymphal cast skins were observed on the under side of the leaves of Magnolia trees, upon which they undoubtedly feed. Adults are attracted to lights at night and remain almost inactive during the day time.

Phlepsius irroratus Say appeared to be of considerable economic importance to alfalfa and clover throughout the central Mississippi Valley states. It was also collected in abundance from various grains during the spring months. The greatest damage done seems to be caused by the feeding of the nymphs and adults upon the stems, which they prefer to the leaves. This irrorate leafhopper exhibits flight as much in day time as at night. Adults and nymphs were captured at all seasons of the year.

Agallia sanguinolenta Prov., the clover leafhopper, has a general distribution, and occurred in sufficient numbers to cause some alarm to alfalfa growers. This with *Empoasca mali* caused considerable injury to alfalfa and red clover in southeast Missouri during the early summer months. It proved, however, to be easily captured in the hopperdozer. This is one of the hardiest of the Jassoidea. Adults were observed to be active in grain fields during the winter months on comparatively cold days, when other species were in hiding or hibernating. The list of food plants is quite limited, it having been taken from but few other plants than those of the Leguminosæ family.

Empoasca mali Le B. was probably the most injurious jassid of the year, adults and nymphs attacking alfalfa, clover, and several other field crops in great numbers. The species occurs everywhere in the Mississippi Valley, and is most injurious in the central states. It easily adapts itself to change of food plants, as

is evidenced by the innumerable plants, shrubs, and trees upon which it is known to feed. This is one of the earliest species to make its appearance in the spring. During 1915 there were at least six generations for the latitude of southern Illinois. The author has for some time suspected this species of being an important factor in the spread and dissemination of the alfalfa yellow leaf spot, *Pseudopeziza medicaginis*, and the brown spot, *Coletotrichum trifolium;* and in this regard possibly *Agallia sanguinolenta* plays a part. The adults exhibit a strong habit of flight, especially at night.

Among other Jassoidea which were common during the year, the following may be listed:

Pediopsis viridis Fitch.
Agallia constricta Say.
Cicadula 6-notata Fall.
Deltocephalus inimicus Say.
Deltocephalus nigrofrons Forbes.
Athysanus exitiosus Uhl.
Athysanus bicolor Van D.
Platymetopius frontalis Van D.
Eutettix seminuda Say.
Typhlocybà comes Say.

ENTOMOLOGICAL NOTES.

Alfred E. Cameron, D.Sc., M.A. (Aberdeen), M.Sc. (Manchester), has been appointed a Field Officer of the Entomological Branch, Ottawa. He will be specially charged with the investigation of the Pear Thrips and other insects in British Columbia.

Dr. Cameron graduated in 1909 in the University of Aberdeen with the degree of master of arts. After taking the further degree of bachelor of science in Zoology, he took up advanced entomological work under Prof. Maxwell Lefroy, Professor of Entomology in the Imperial College of Science, London, and continued his entomological research work as an Honorary Research Fellow in the University of Manchester in 1912, where he took the degree of master of science (M.Sc.). He was appointed by the English Board of Agriculture and Fisheries to a Government Scholarship, and continued his investigations in England and in the United States. In 1914 he spent a year conducting practical entomological

work and spraying experiments in the Agricultural Experiment Station of New Jersey under Dr. Headlee, State Entomologist, and returned to England to take up university work in Manchester and the University College of South Wales. He has published a number of entomological memoirs in various scientific journals and received his doctorate in 1915. His thorough scientific and practical training will make him a valuable addition to the Entomological Branch of the Dominion Department of Agriculture.

* * * *

Thomas H. Cunningham.

We regret to announce the death, on February 16th, of Mr. Thomas H. Cunningham, Inspector of Fruit Pests for British Columbia, at the age of 78 years. Mr. Cunningham's health had been poor during the last two years, but he continued his duties in spite of advanced years and diminished vigour with a characteristic tenacity.

For many years he had served the Board of Horticulture of British Columbia as its Inspector of Fruit Pests with a zeal rarely equalled. It was natural that in the prosecution of his work of inspecting orchards and nurseries, imported nursery stock and fruit, he should fail to please everybody; but to the wholehearted enthusiasm with which he carried out his work is due, to no small degree, the comparative freedom of British Columbia orchards from some of our most serious fruit pests. To name two in particular, the Codling Moth and San José Scale, would have been widely distributed by this time but for the energetic methods he employed. The fruit growers of the province owe much to his industry, and his death removes a unique member of the Entomological fraternity of Canada.

* * * *

The Ohio State University has recently inaugurated a plan providing for Research Professors which enables the holders to devote their time especially to research work, and Professor Herbert Osborn has been elected Research Professor in the Department of Zoology and Entomology. He will be relieved from routine, class and department duties, devoting his time to researches, especially in the line of Entomology, but will continue to have direction of research work of Graduate students in his particular field.

Mailed May 15th, 1916.

LEPERISINUS CALIFORNICUS, N. SP.

Adult (enlarged 10 diam.); and tunnels in olive branch (natural size).

The Canadian Entomologist.

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NEW SPECIES OF THE FAMILY IPIDÆ (COLEOPTERA)* PART III.

BY J. M. SWAINE,
ENTOMOLOGICAL BRANCH, DEPARTMENT OF AGRICULTURE, OTTAWA.

Pityokteines jasperi, n. sp.

A small, very slender species, closely allied to *sparsus* Lec; with the elytra very closely, regularly, deeply punctured behind.

Description of the female—Length, 2.3 mm.; width, .7 mm.; colour, dark piceous, nearly black, with the antennæ and legs paler. The *head* has the front plano-convex, densely very finely granulate, with a small median tubercle, and thickly clothed with very long curved yellow hairs much as in *sparsus;* the antennal club thickened basally, very obliquely truncate and depressed apically, with the sutures confined to the apical depressed outer surface.

The *pronotum* is distinctly longer than wide, with the sides straight on the basal half, broadly evenly rounded in front; coarsely, rather densely, and irregularly asperate in front; rather coarsely, moderately closely and deeply punctured behind, more finely near the rather wide smooth median line; with sparse long hairs about the sides and in front, and the front margin densely fringed with long curved yellow hairs.

The *elytra* are elongate, with the sides parallel beyond the middle, the striæ narrowly faintly impressed, the sutural striæ distinctly deeper and wider, the strial punctures of median size, very close on the disc, and deep; the interstrial punctures regularly uniseriate, deep, as large as those of the striæ and nearly as close on the caudal half, as close and granulate near the declivity, a little smaller and less numerous towards the base. The declivity is steep, convex, with the suture elevated and granulate and the

*Contributions from the Entomological Branch, Department of Agriculture, Ottawa.

sutural striæ strongly impressed; almost unarmed, with the declivital teeth reduced to three extremely minute acute granules in the usual situations, on the 2nd and 3rd and 6th interspaces, with a very few additional minute granules; the declivity very closely and deeply punctured. The pubescence of the elytra is rather short and abundant on the sides and behind.

The *male* has the front plano-convex, densely, deeply granulate-punctate, with an indistinct median carina, and sparsely hairy; the declivity concave from the deeply widely impressed sutural striæ, sparsely deeply punctured, shining, the 2nd and 3rd teeth large, acute, within the rather distinct granulate lateral margin, the 2nd curved, the first tooth minute. Jasper Park, Alberta, Canada. The type is in the collection of the Entomological Branch, Ottawa.

Pityokteines elegans, n. sp.

This species is closely allied to *sparsus* (*balsameus*) Lec., but is slightly more elongate, with the elytral striæ finely, regularly impressed, and the interstrial punctures very small.

Description of the female—Length, 2.5 mm.; the *head* has the front flattened, densely, finely granulate, very densely clothed with very long incurved orange-coloured hairs; the antennal club wider than long, the first suture nearly straight except at the sides, the distal oblique part strongly depressed.

The *pronotum* is slightly longer than wide, with the sides feebly arcuate on the basal half; the front margin broadly rounded, rather closely asperate in front; rather finely and sparsely punctured behind, with a wide smooth median space; the hairs sparse, long and erect about the sides, thicker on the frontal declivity and gradually longer from the summit to the apical margin, which is densely fringed with very long orange hairs similar to those of the front of the head.

The *elytra* are slightly longer than in *sparus*, with the sides parallel, the apex semicircularly rounded, the striæ finely regularly impressed, the sutural striæ somewhat deeper and wider than the others; the strial punctures small and very closely placed, slightly smaller at the base; the interspaces wide, moderately convex on the disc, smooth except near the declivity; the interstrial punctures

sparse on the disc and distinctly smaller than those of the striæ, becoming closer, as large as those of the striæ and granulate near the declivity and on the sides; the declivity very steep, almost as in *sparsus*, shining, sparsely but strongly punctured; the suture raised, the declivital face somewhat circularly flattened and rather deeply and broadly sulcate on each side, with three small, acute teeth on each side, situate just within the rather ill-defined, crenulate, lateral margin of the declivity, the ventral acute margin formed by two crenulations on each side and absent near the suture.

The *male* has the front convex, rather coarsely punctured, more sparsely behind, rather densely towards the epistoma, the punctures slightly granulate, sparsely hairy; the pronotum without the fringe of long hairs from the front margin; the elytral declivity deeply concave, with the 2nd and 3rd teeth of each side forming part of the lateral margin and very large, stout, incurved and acute.

Described from four females and two males, sent by Professor H. F. Wilson, Corvallis, Oregon, Labels: Hood River, O.; Childs Coll.; 8-20-14; Also, Grassy Lake, Lassen Co., Cal., *Pinus monticola*, Mr. Ralph Hopping. The type is in the collection of the Entomological Branch, Ottawa.

Orthotomicus lasiocarpi, n. sp.

A very small slender species combining characters of *Orthotomicus* and *Pityokteines*.

Description of the female—The length, 2 mm.; slender. The *head* has the front convex, deeply rather coarsely punctured, sparsely towards the vertex, densely towards the epistoma; with a wide median carina on the caudal two-thirds; transversely impressed on the epistoma; the pubescence short and inconspicuous, closer on the epistoma; the antennal club slightly longer than wide, obliquely truncate on the distal half, with the distal segments showing from the upper side at the apex, the sutures procurved, the sutures of the under face on the distal half and slightly procurved.

The *pronotum* is slightly longer than wide, feebly arcuate on the sides behind, slightly constricted before the middle and broadly

rounded on the front margin; the asperities of the cephalic half numerous and subconcentric; the caudal half moderately deeply, closely punctured, densely on the sides; the median line smooth, and narrowly carinate from the summit to the base; the lateral oblique depressions connected across the dorsum.

The *elytra* are elongate, with the sutural striæ slightly, broadly impressed, a little more widely behind; the other striæ not impressed; the strial punctures very small, moderately close and deep; the interstrial punctures nearly as large and nearly as close as those of the striæ, finely granulate behind; the suture elevated except at the base and granulate towards the declivity. The *declivity* convex from the side, steep, the sutural striæ deeply widely sulcate, wider towards the apex, terminated before the apex of the elytra by the obtuse, narrow, apical projection; shining, very minutely rather sparsely punctured; with a few minute denticles on each side in the usual position on the crest of the lateral convexity, the 1st on the end of the 2nd interspace, the 2nd on the 3rd interspace, and two close together on the 5th and 6th interspaces. The second visible abdominal sternite is as long as the two following ones united. The male has the front as in the female; it differs only in having the declivital denticles of the 2nd, 3rd and 6th interspaces developed into small acute teeth, and the declivital impression apparently deeper thereby. The genitalia have the "trough" a very long spiral band and the processes (feet) very long and slender, very much as in *sparsus*.

This species is of the size of *jasperi*, but more slender, and is allied to the species of *Pityokteines* in the small size, the elytral punctuation, the poorly developed apical projection of the elytra, the long second visible abdominal sternite, and the characters of the male genitalia. The antennal club, however, although flattened considerably, has the apical segments incompletely telescoped, showing distinctly at the apex from the upper side, the apex of the declivity, too, is distinctly though obtusely margined; and the female lacks the strong tuft of hairs on the front; these characters unite the species rather definitely with the genus *Orthotomicus*.

Type series from Rogers' Pass, British Columbia, abundant in *Abies lasiocarpa;* Edmonton, Alta., abundant in *Larix americana*. The type is in the collection of the Entomological Branch, Ottawa.

Orthotomicus ornatus, n. sp.

This is a small elongate species, allied to *sparus* (*balsameus*) Lec., and also to *cælatus* Eichh.

Description of the male—Length, 2.3 mm. The *head* has the front convex, closely, rather coarsely granulate, with the median carina nearly obsolete, the hairs long but sparse; the antennal club about as wide as long, thickened basally, the apical half strongly obliquely truncate, the first suture recurved, with the apical segments almost completely telescoped, showing only one suture at the apex, on the upper surface.

The *pronotum* is distinctly longer than wide, with the sides straight to well beyond the middle, then narrowed to the broadly rounded front margin; coarsely very sparsely asperate and finely granulate, moderately punctured behind, closely on the sides, rather sparsely on the disc, with a smooth medium space becoming narrow and slightly carinate towards the summit.

The *elytra* have the sides straight and parallel for four-fifths the length; then semicircularly rounded behind as viewed from above; the striæ narrow, straight, regular, and slightly impressed; the sutural striæ slightly wider and more strongly impressed on the disc, still more strongly behind, but not widened before the declivity; the strial punctures rather large except towards the base, regular, quadrate, and *very closely placed;* larger and closer behind; the interspaces nearly flat, those of the disc wider than the striæ in front and narrower towards the declivity, uniseriately punctured, the punctures rather numerous, about 12 on the discal interspaces between the base and the top of the declivity, the punctures very small in front becoming as large and close as those of the striæ and granulate near the declivity. The *declivity* is vertical, moderately concave, somewhat less deeply than the male of *sparsus;* densely, coarsely punctured and hairy; with three acute teeth on each elytron, the first tooth minute, on the second interspace; the second extremely coarse, stout at the base, acute, incurved, on the third and fourth interspaces, much closer to the first tooth than to the third; the third smaller, slender, straight and acute, on the sixth and seventh interspaces; the second and third on the margin of the declivity, which is completed laterally

by a subacute arcuate ridge connecting the second and third teeth; with a small denticle on the end of the fifth interspace at the base of the second tooth; the apical margin of the declivity narrowly separated from the elytral margin, moderately acute, entire, extending across the suture.

The female has the front closely coarsely granulate-punctate, with a narrow median carina on the caudal half developed into a compressed tubercle at the cephalic end on the centre of the front, and with a deep transverse impression between the tubercle and the margin of the epistoma; the declivity nearly vertical, similar to that of the male, but much less deeply concave; the sutural striæ still distinctly but much less deeply and broadly sulcate, and the sides of the declivity less elevated and less distinctly margined; the apical margin feeble, barely distinct at the suture; with smaller teeth, situated much as in the male, on the convexity laterad of the sulcus, but in a straight oblique line, the first minute, the second and third alike, small, conical and acute; the concavity densely, coarsely punctured and hairy as in the male. The second visible segment of the abdomen is as long as the next two united.

This species unites the characters of *Orthotomicus* with those of *Pityokteines*. It is allied to *Orthotomicus* in the frontal secondary sexual characters, and in the fairly distinct apical margin of the declivity; but rather closely to the typical *Pityokteines* in the small size, long second visible abdominal sternite, and frequently by the characters of the somewhat variable antennal club.

It is represented in our collection as follows: A short type series from Williams, Arizona, in the Cornell Uni. Collection, No. 302, sub. 100; a short series from Oregon sent by Professor H. F. Wilson; a short series from Tulare, Co. Cal., taken by Mr. Ralph Hopping in *Pinus ponderosa* and *Pinus jeffreyi*. The type is in the collection of the Entomological Branch, Ottawa.

Ips chagnoni, n. sp.

Description of the male—Length, 4.7 mm.; width, 1.75 mm.; larger and stouter than its close ally, *grandicollis* Eich., sides of prothorax and elytra nearly parallel, pronotum slightly wider than the elytra; clothed with stiff, erect, reddish hairs, thick

about the sides, front of the pronotum and margin of the declivity, sparse on disc of pronotum and disc of elytra.

The front of the *head* is much as in *grandicollis*, but more coarsely sculptured, with a median coarse granule near the epistomal margin, succeeded by a broad median impression, and this by the wide smooth median line; the antennal club has the sutures rather broadly but strongly angulate.

The *pronotum* is distinctly but only moderately longer than wide, broadly rounded behind, with the hind angles oblique; the sides subparallel to the middle, then obliquely narrowed and broadly rounded in front; the asperities of the cephalic half rather small and concentric near the summit; the caudal part smooth and shining, rather finely and moderately closely punctured on the disc, with the smooth median space obsolete except at the centre of the disc, closely and more coarsely punctured on the sides.

The *elytra* are punctate-striate, with the striæ slightly impressed on the disc, excepting the sutural striæ, which are very deeply impressed and wider behind, with the punctures larger, closer and transverse; the punctures of the remaining striæ of medium size, circular and more closely placed on the disc; the interspaces flattened, excepting the first two, which are distinctly convex; all the interspaces confusedly punctured and granulate at the margin of the declivity; the lateral interspaces closely uniseriately punctured, with punctures as large as those of the striæ, the punctures confused at the base, near the declivity, and on the last two interspaces; the discal interspaces more sparsely punctured, the first rather closely uniseriately punctured throughout and granulate near the declivity, the second punctured only near the declivity and the base, widest and the most strongly convex; the third with three widely separated punctures in addition to those at the base and near the declivity; the fourth punctured forward to the middle and again at the base; the fifth sparsely punctured at the base and closely towards the declivity; and the remaining interspaces closely punctured; the elytra rather densely clothed with stiff reddish hairs on the sides and around the margin of the declivity, with a few hairs along the base, and very sparsely hairy on the disc. The *declivity* is deeply excavated, coarsely,

not densely, confusedly punctured, with numerous minute hairs, thicker and longer near the margin and on the strongly raised suture; the declivital armiture nearly as in *grandicollis* Eichhoff; the first tooth small, acute, on the end of the second interspace; the second, on the fourth interspace, large, acute, the apex directed dorso-mesad with the caudal margin crenulate and nearly vertical, connected at its base with the third tooth, which is stouter and longer, blunt and somewhat curved meso-caudad; the fourth and fifth teeth smaller and acute, on the declivital margin between the 3rd and the acute apical margin, which is narrow, acute, and raised almost to the level of the tips of the 4th and 5th teeth.

The *female* is somewhat less coarsely sculptured on the front and declivity.

There is considerable variation in the punctuation, and the discal striae of the elytra are frequently decidedly impressed, with all the discal interspaces convex. The length varies from 4 mm., to 5.2 mm.

This species is distinct from *grandicollis* Eich. in the larger size, stouter form, shorter pronotum, and confusedly punctured interspaces near the declivity; from *vancouveri* and *confusus* by the very sparse punctures on the basal half of the discal interspaces.

The species is abundant in Ontario and Quebec Provinces, chiefly in *Picea canadensis* and *Pinus strobus;* it extends southwards into New York State. The type is from Montreal Island, P. Q., collected by Mr. G. Chagnon, of Montreal, and is deposited in the collection of the Entomological Branch, Ottawa.

Ips vancouveri, n. sp.

Description of the male— Allied to *confusus* Lec., but stouter, densely hairy, and much more coarsely sculptured; length, 5 5 mm.; colour, dark reddish brown.

The *head* has the front evenly convex, coarsely rather sparsely granulate, more finely and densely on the sides; the epistoma transversely impressed, with a narrow median emargination; with a compressed, short, blunt median tubercle at the base of the epistoma, followed by a small median impression, and the smooth median line obsolete; the vertex shining and nearly smooth; the

sutures of the antennal club very strongly angulate at the middle; the pubescence of the front close, long and erect.

The *pronotum* is distinctly longer than wide, widest at the base, with the sides slightly arcuately narrowed for two-thirds the length, then strongly narrowed to the narrow but broadly rounded front margin; subconcentrically, not very densely asperate in front; the pubescence abundant and long about the sides and in front; closely, rather coarsely and deeply punctured behind, more closely on the sides.

The *elytra* are as wide as the pronotum, with the striæ strongly impressed on the disc, distinctly impressed on the sides; the sutural striæ deep and wide, deepened towards the base, and widened behind; the strial punctures coarse, close, deep and quadrate, smaller near the declivity, the discal interspaces strongly convex and coarsely roughly punctured, not closely near the base, densely and confused on more than the caudal half, and granulate about the declivity; the lateral interspaces with the punctures less coarse but very densely confused throughout; the first interspace closely confusedly punctured and uniseriately granulate; the second interspace the widest, sparsely punctured in front, closely, confusedly granulate-punctate on more than the caudal half and with a row of acute granules terminating in the first declivital tooth, *which is much closer to the second tooth than to the suture;* the declivital teeth otherwise nearly as in *confusus*, but distinctly coarser, the 2nd tooth conical acute, with its caudal margin sinuate and nearly vertical, close to the 3rd, which is stout, subcapitate and curved downwards, the 4th and 5th conical, on the margin of the declivity between the 3rd and the narrow, strongly produced apical margin; the concavity densely, deeply, rather finely punctured, and densely clothed throughout with long slender pale hairs; the elytra densely clothed with long hairs, more sparsely on the disc.

The female has the frontal tubercle of the male represented by a slight median episternal carina, followed by a median shining impressed area, and the declivital teeth less strongly developed.

The species occurs in Sitka spruce and western white pine on Vancouver Island and the coast of British Columbia; it occurs

at Kaslo, B. C., and probably elsewhere in the interior. The type is from *Pinus monticola*, Quathiaski Cove, B. C.

The size varies moderately, from 5 mm. to 5.7 mm. in length; the colour, from dark reddish to black; the punctuation from coarse to moderate in size. The type is in the collection of the Entomological Branch, Ottawa.

Leperisinus californicus, n. sp.

This species is allied to *aculeatus* Say, of the same size and shape, with the yellow-grey markings very distinct.

Description of the female—Length, 2.5 mm.; colour, black, with the apex of the pronotum, the base of the elytra, the scape and funicle of the antennæ and the legs red, and the pronotum and elytra distinctly marked with areas of yellow-grey scales. The head has the front broadly moderately concave in front, convex towards the vertex; very finely reticulate and moderately shining; finely granulate-punctate, sparsely in front, with closer, shorter, erect, dark, plumose hairs behind, the epistoma bearing very long, upcurved, slender, plumose hairs, and from the margin a dense fringe of very long, simple, orange-coloured hairs; a subtriangular area behind the epistoma more brightly shining and with a faint trace of a median carina; the antennal club pubescent, elongate oval, moderately compressed, with the sutures transverse, the last oblique.

The pronotum is very much wider than long, strongly arcuate on the sides and very strongly narrowed in front to the very broadly rounded but not emarginate front margin; with coarse, shallow punctures, finely scabrous on the median area, with rather numerous coarse, lunar rugosities on the middle of the sides, ending in front in a submarginal row of rugosities connecting the lateral dark areas; the colour-markings somewhat as in *aculeatus*, with a black lens-shaped, longitudinal, median area, clothed with elongate, plumose, dark-coloured, almost invisible scales, intermixed with stout plumose hairs; with a longitudinal, narrow, irregular, medially widened, black area in the middle of each side and the remainder of the disc densely clothed with very wide, flat, yellow-grey, plumose scales, with a few stout plumose hairs intermixed, the

scales gradually becoming stout plumose hairs on the ventral surface and along the front margin.

The elytra are shaped much as in *aculeatus*, strongly elevated, arcuate and serrate on the basal margin, and narrowly rounded behind as viewed from above; the declivity very strongly oblique, from the side, so that the median line of the elytra is almost evenly broadly arcuate in profile from the middle to the apex; clothed with scales and erect hairs; the striæ very narrow, slightly impressed; the strial punctures small and indistinct; the interspaces wide and nearly flat, on the disc slightly convex towards the base; the suture elevated on the caudal two-thirds, and the third interspace convex, more strongly on the declivity; the interspaces with uniseriate coarse rugosities, becoming lunar and more numerous at the base and more acute behind; densely clothed with very wide, often subcircular, flattened, plumose scales which become stout plumose hairs at the base, long, conspicuous and usually black on the caudal two-thirds of the sides, very slender near the side margin, becoming very large, erect, widely spatulate scales behind on the disc, longer and densely placed on the first and third interspaces of the declivity, making those interspaces apparently carinate, nearly obsolete on the second declivital interspace; on the disc the vestiture coloured in three yellow-grey bands alternating with three dark subtransverse bands; the first band black, suffused with reddish, basal; the second band pale, wide, from the suture to the side margins, extending irregularly backwards on the side, with the pale section of the first interspace attaining the scutellum, that on the second extended farther behind, that on third nearly obsolete; the second pale band, the fourth from the base, is a subquadrate blotch on the 2nd, 3rd, 4th and 5th interspaces, extended forward on the 5th and connected diagonally by scattered pale scales with the base of the first pale band, evidently the remnant of a strongly oblique pale band, surrounded by the 3rd and 5th bands, which are black, and meet on the middle of the side to be extended irregularly to the side margins; the third pale band, the sixth from the base, is transverse, apical, with a narrow extension forward on the 4th and 5th interspaces nearly to the 2nd pale band, and connected by scattered pale scales with a caudal extension of the 1st pale band on the 8th interspace.

The ventral surface is strongly inflated at the metathorax, the abdomen strongly oblique from the metathorax to the apex; the last segment strongly flattened and the last three sutures very deep; clothed with greyish, stout, plumose, scale-like hairs with slender plumose hairs intermixed towards the middle line, with a *dark area* covering the last two segments and the caudal border of the 3rd densely clothed with erect black hairs.

The male has the front less concave, with a well-developed acute postepistomal median carina, with the hairs on the epistoma short except the marginal fringe, which is moderately long.

Labels with the type: San Diego, Cal., 7-18-15, olive, ♀. Adults and work in olive branches were received from Professor E. O. Essig and Dr. E. C. Van Dyke. The species was taken from living olive trees, at San Diego, Cal., in 1914, and was causing much injury to the host. Two specimens of the same species were received from Mr. Ralph Hopping, taken by him on brush in the chapparal belt, Camp Greely, Fresno Co., Cal., 3,000 ft., in 1909.

The type of this species is in the collection of the Entomological Branch, Ottawa.

THE NYMPHS OF ENALLAGMA CYATHIGERUM AND E. CALVERTI.

BY E. M. WALKER, TORONTO.

The nymph of *Enallagma cyathigerum* Charp. has been described by Lucas ('00)[1] and Ris ('09)[2], that of *E. calverti* Morse by the present writer ('13)[3]. No description of the nymph of the former species based on American specimens has, however, yet appeared, and this has been a desideratum for two reasons.

In the first place the American form of *cyathigerum* was originally described as a distinct species (*E. annexum* Hagen), and has been frequently cited under this name, or as *E. cyathigerum* race *annexum*, and although Williamson ('02)[4] pointed out its identity with *cyathigerum*, and has been generally followed, the question of the validity of *annexum* as a race has always seemed to me not indisputable. I have examined a large number of Canadian specimens from a very wide range of territory and also a number of European examples, and, although I regard them all as one species, I have never had any difficulty in separating the

males of the American form from those of the European form by the shape of the abdominal appendages. The difference is slight, but constant in the material I have examined.

In the second place, having recently reared *cyathigerum* at Toronto, I find that the nymph does not wholly agree with Ris' description and figure (I have not had access to Lucas' description), but that, on the other hand, it is so extremely like that of *calverti* that a comparative study of these forms is necessary in order to make their separation possible.

Early in June, 1914, I found *E. cyathigerum* in considerable numbers at "Fisherman's Island," a long narrow sand bar, south of the city, which separates Ashbridge's Bay from the open lake, and, until recent filling-in operations commenced, was margined on the inner side by a wide extent of marsh. It proved too late to obtain the nymphs that season, but on May 24 of the following year a visit was made to the same spot and about twenty mature nymphs were secured. They were accompanied by large numbers of *E. hageni*. On May 26 a male *cyathigerum* emerged, and as the identity of the nymphs was now assured, the remainder was preserved for study. Imagos had already become quite numerous on the island, and soon became abundant. A large number were examined, but all were alike; no specimens of *calverti* were found among them. Shortly afterwards they disappeared and were followed, as in the previous year, by swarms of *E. hageni*.

During the season of flight of *cyathigerum*, *E. calverti* was common about a pond in the vicinity of my house in Wychwood Park, Toronto, and I reared this species again here, as I had previously done at Lake Simcoe and Go-Home Bay, Ont. I was thus able to obtain sufficient material for a comparison of the nymphs of the two species.

The Nymph of *Enallagma cyathigerum*. (Pl. IX).

Very similar to *E. calverti* Morse in size, form and coloration (*v.* Can. Ent., XLV, 1913, p. 162, pl. 1, figs. 4, 5). Head as in

1. British Dragonflies, pp. 297-307.
2. Die Süsswasserfauna Deutschlands. Heft 9, Odonata, pp. 50, 54.
3. Can. Ent., XLV, No. 6, p. 162.
4. Proc. Acad. Ind., p. 121.

E. calverti, differing from that of *E. hageni*, *E. ebrium*, *Ischnura verticalis* and *Canagrion resolutum* in the somewhat more prominent eyes and postero-lateral surfaces of the head, these parts having a somewhat more strongly sinuate outline in dorsal view (cf. Can. Ent., *l.c.*, figs. 4, 6). Labium of the usual form in this genus, the lateral margins in about the proximal two-thirds straight and diverging at an angle of about 30°, in the remainder at about 70°, breadth at the base of lateral lobes four-fifths of the length; mental setæ 4, sometimes 3 on one or both sides, lateral setæ 6; lateral lobes of the usual form, the end-hook preceded by 2 or 3 teeth, which are preceded by a more or less denticulated and incurved margin. Spinules on lateral margins of abdominal segments of moderate size, forming an irregular single or partly double series and not increasing much in size near the postero-lateral angles.

Gills long and relatively narrower than in *E. hageni*, the margins of a little less than the proximal half spinulose, the spinules somewhat coarse, particularly on the dorsal margin of the median gill and the ventral margins of the lateral gills, distal margins with moderately long slender hairs; apices convexo-angulate or rounded. The greatest breadth is just before the distal end of the spinulose margins, measuring between one-fourth and one-fifth (median gill) or one-fifth and one-sixth (lateral gills) of the length. Beyond this point the gills are suddenly, though slightly, narrowed.

The lateral appendages (superior appendages of adult) differ in form in the two sexes. In the male, they are rounded and somewhat depressed, in profile about half longer than deep, and, when viewed obliquely from above, they present a distinct, though shallow, dorso-caudal concavity; viewed directly from above, they appear about as broad as long with convex margins, especially the outer. In the female, these appendages are subpyramidal, tapering to a blunt apex, the outer margin in dorsal view nearly straight, the inner margins somewhat more convex toward the base.

Colour—Olivaceous or brownish-green (brownish-yellow in alcoholic specimens), generally nearly uniform, but frequently more or less speckled with dark irregular spots, the abdomen

usually with diffuse, dorsal longitudinal dark band, divided by a pale median line, and sometimes with a definite row of dark spots on the sides, legs pale, femora with a darker anteapical annulus, which may be faint in pale specimens. Gills generally diffuse greyish-brown, sometimes very pale, sometimes quite dark, typically with three or four narrow, transverse, somewhat angular bars about the middle or slightly beyond, following one another closely and sometimes partly confluent, the first band usually the most distinct and in very pale specimens sometimes the only one present. In well-marked specimens there may be an indication of another band farther distad, and in dark specimens there may also be considerable pigmentation along the tracheal branches and sometimes dark blotches independent of the tracheæ.

Length of body 21-21.5 mm.; hind wing-pad 4-4.8 mm.; hind femora 3.8-4.4 mm.; gills 7.5-8.5 mm.

As in the case of the adults, the nymphs of *E. cyathigerum* and *calverti* differ apparently only in one constant character, the form of the superior (lateral) abdominal appendages of the male. In the nymph of *calverti* these appendages in profile appear fully as deep as long, with a much broader and more bluntly rounded apex, which is somewhat above the mid-longitudinal axis. The sulcation seen in *cyathigerum* in an oblique view from above is not present in *calverti*. The outline of the appendage viewed directly from above is less rounded than in *cyathigerum*, the outer margins being but slightly curved, and passing into the posterior margins by a rounded angle. There is a distinct submedian longitudinal ridge.

Ris' figure of the gill of a European specimen of *E. cyathigerum*, reproduced from a photograph, differs considerably from the gills of my specimens, being more like those of *E. hageni* and *E. ebrium* in form. It is little more than three times as long as broad; the margins are more evenly convex, and the marginal spinules appear decidedly smaller, those of the stronger series not interrupting the curve of the margin as in American specimens and in *E. calverti*. In Ris' figure, the gill is broadest beyond the apex of the spinulose part of the margins, while in American specimens the greatest width is just before this point. The gill is also described as having no transverse bands and none appear on the figure.

Explanation of Plate IX.

Figs. 1-5, *Enallagma cyathigerum*, Charp., nymph; 1, median gill; 2, lateral abdominal appendages of female, dorsal view (median gill removed); 3, lateral abdominal appendages of male, dorsal view; 4, right appendage of male, profile view; 5, same, dorso-lateral view. Figs. 6-8, *Enallagma calverti* Morse, nymph; 6, lateral abdominal appendages of male, dorsal view (median gill removed); 7, right appendage of male, profile view; 8, same, dorso-lateral view.

GEOFFREY MEADE-WALDO.

All who attended the Jubilee Meeting of the Entomological Society of Ontario in August, 1913, remember, among other pleasant recollections of that meeting, the pleasure which the presence of Mr. Meade-Waldo occasioned; Mr. Meade-Waldo attended the meeting as a representative of the British Museum of Natural History. To all those and to his other friends in Canada his untimely death in March will come as a shock. He had a peculiarly winning manner and a deep love not only of the science to which he chiefly devoted himself, but to nature generally, as he was a keen ornithologist and an ardent advocate for the preservation of wild life. His enthusiasm was very marked during the excursion we made at the time of the meeting to Grimsby, from which excursion he arrived home not only with his hands full, but, in the absence of a third prehensile organ, carrying in his mouth a twig bearing a Sphinx caterpillar.

Mr. Meade-Waldo was born in January, 1884, and after being educated at Eton and Magdalen College, Oxford, he visited the East, including the Federated Malay States and Borneo. In 1909 he was appointed to the Entomological Department of the British Museum, Natural History, where at the time of his death he had charge of the Hymenoptera. In this group he had already carried out valuable and much-needed work, and his death will be a severe loss not only to British entomology, but to a still wider body of entomologists who were following his promising career with great expectations.

C. Gordon Hewitt.

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NYMPHS OF ENALLAGMA CYATHIGERUM AND E. CALVERTI.

(Page 193.)

POPULAR AND PRACTICAL ENTOMOLOGY.

Fresh Woods and Pastures New.

BY FRANCIS J. A. MORRIS, PETERBOROUGH, ONT.

II.

Just east of the city, overlooking the Lift Lock, stands a high hill, bare of trees. Yet even this naked hog's back has points of interest; for example, a month ago I discovered that a strange family had established squatter's rights on the face of it; they had come from the far west, but whether hobo-fashion, bumping it along the railway, or as stowaways in one of the large grain boats so often seen (by politicians and farmers) plying back and forth on the Trent Valley Canal, I do not know. Their godfather was a Russian, Hieronymus Grindel, and Gray describes them as "rarely adventive" eastward; rare or not, they have certainly arrived at Peterborough and come to stay: *Grindelia squarrosa*, the Gum-plant or Tar-weed. But the chief point of interest in this hill just now is the extensive view it affords of Peterborough's environs. It was from its summit as a vantage ground that I first spied a long stretch of thickly wooded country, about a mile south of the Lift Lock and running east as far as the eye could see. The nearest point in this line of forest is Burnham's wood.

My first expedition to this discovered a number of newly-felled pines on a side-road near the Burnham farmhouse and orchard. These were visited two or three times in June, and besides the common Monohammi, Clerid's and Buprestids of the white pine, I captured seven specimens of *Acanthocinus obsoletus*, a light grey beetle with extremely long antennæ; it is very fond of resting on the under side of the trunk of pine trees in their first season of decay. I once captured nearly a score of these in the first half of June on a single pine, that in falling had lodged in the crotch of a neighbouring tree. I took also five specimens of a *Neoclytus*, which I think is *longipes:* head, thorax and body black, with three grayish-white lines of pubescence on each elytron; viz., a vertical crescent at the base, an oblique median line, and a transverse wavy line near the apex. I have taken it before on white pine, and have never found it on any other tree; the kindred species, *erythrocephalus*, reddish-brown in colour with yellow marks

on the elytra, prefers hardwoods, especially oak, hawthorn and maple. Towards the end of June I captured on the same pine trunks a specimen of *Leptostylus sex-guttatus* (*commixtus*).

Rather nearer the wood was a swamp of willow and alder, and early in June, while testing out the local distribution of *Chrysomela*, I spied the graceful outline of a longicorn's antenna projecting over the edge of an alder leaf just above my head. The sun was near the zenith, and I could see through the leaf the oblong shadow of the insect's body. By mounting on a large overturned pine stump I could just reach up to the leaf and carefully closed my finger and thumb over the quarry. I then broke off the leaf with my free hand and succeeded in transferring my capture to the cyanide bottle. To my surprise this proved to be a pair of longicorns —the male barely a third the size of the female. I had never seen the beetle before. It was *Batyle ignicollis*, but, so far, I have been able to learn nothing of its life-history.

The wood itself was a somewhat low-lying hardwood with hemlock intermingled; a couple of paths ran through it that had been used in the spring at the gathering of maple sap. Near one of these paths were some stumps and also a large fallen tree of basswood. The first find I made was in fresh fungus on one of the stumps. Here I captured fully a score of a certain staphylinid: apparently all in the same colony, yet (according to cabinet methods) there were specimens here of five or six species. I am glad to see that Blatchley is suspicious of this unnatural system of classification. If there is any value in field observation, his suspicions are more than justified. The beetle was *Oxyporus*, and my specimens showed every sort of gradation from black to yellow, answering to three or four of Blatchley's specific descriptions, and probably several others not given in Blatchley. Half of them, no doubt, simply varietal and based on a single capture.

About the sheaf of leaves sprouting round the stump I took one or two specimens of *Saperda vestita*, and, on the trunk of the fallen basswood in the first week of June a treat was in store for me that I had not had for seven years or more, immense numbers of the basswood *Saperda* emerging from the bark or ovipositing on the trunk. There is a certain season, early in June, and no other (in my experience) when this sight is possible. Two or three

days later, and this tree showed hardly one insect for every score at the earlier date.

It was quite early in June, too, that I found, resting on the underside of a limb of the tree, very hard to discern in the shadow, a fairly large grey beetle; about the size of *Urographis fasciatus*, but abundantly distinct (when the two are set side by side); moreover, what to me seemed more important than all, frequenting basswood. Often as I have found *Urographis*—sometimes in considerable numbers—it has always been on oak, maple, or some other tree with exceedingly hard and close-fitting bark. So I set representatives of six or seven related genera, including the true *Urographis*, alongside of my stranger. The elytra of this latter were rounded at the tip, the hind tarsi all small, and the scape of the antennæ short and bulging; it was most like *Acanthoderes*, or *Acanthocinus*. These, unfortunately, were at opposite ends of the Tribe *Acanthoderini;* the subdivision of genera in the tribe is based on the shape of the antennal scapes. In my beetle these were strongly clavate. Apparently, then, it was *Acanthoderes;* but that genus proved to have dorsal tubercles. My beetle had three shining black spaces on the disk of the thorax, corresponding in size and position to such tubercles, but not in the least gibbous. I then went a step further back to the tribal distinction (between *Acanthoderini* and *Pogonochærini*); this depends on the shape of the front coxal cavities. With some misgiving, I immersed one of my three specimens of the beetle in hot water—a baptism which fortunately did no damage. As soon as the joints were relaxed and the surface dry, I went on with my scrutiny. The coxal cavities were distinctly angulated. I turned to the Tribe *Pogonochærini*, and had the joy of identifying beyond a shadow of doubt, even to the species, and that from LeConte and Horn's masterpiece of generic classification; *Hoplosia nubila:* a beetle *sui generis*, so that the description in the key was no less than a detailed etching of the very object before me. The description tallied in every stroke, and to cap it all I found the following notes: In LeConte & Horn—"the genera of this tribe are dispersed by Lacordaire among three groups; the genera have a characteristic habitus, with the exception of *Hoplosia*, which resembles a *Graphisurus*, but with the antennæ of *Acanthoderes;* and in Blatchley—"*Hoplosia nubila* is said to breed in dry twigs of beech and LINDEN."

On a second visit to this tree in the first half of June I had the good luck to capture a second specimen, and this year at the same date on a similar log in a wood farther east I captured a third.

At the end of June, some miles west of Peterborough, on a fern limb of basswood (in which the sap was probably fermenting) I took a specimen of *Leptostylus macula*, and out of curiosity revisited the tree in Burnham's wood. Here on one of the upper branches I found—apparently waiting for me—its duplicate.

In this same month of June, while following a path through the wood, I caught sight of a very beautiful chrysalis fastened to the underside of a leaflet of butternut. It was short and broad, white with black markings; it appeared to be thick through and ornamented with ridges or prominences on the face of it; visions of a brand new chrysomelid floated before me. Unfortunately the leaf of butternut was firmly attached to a stem 12 or 14 feet up the tree. As I circled round the base of it, with my eye glued on the chrysalis, no doubt I made a good picture for an up-to-date version of Æsop's fables—The Fox and the Grapes. Well, there was no help for it! If I wanted that chrysalis, I'd got to climb. The revival of a long disused habit—like that of climbing trees—sometimes recalls interesting memories. It is said that the late Prof. Bain, of Aberdeen, soon after the publication of Darwin's "Descent of Man," was found crawling about his study floor in the hope of recovering some of the long-lost sensations of primitive man before he assumed the erect habit. Who knows but that I might, on the same atavistic principle, retrieve some arboreal memory from quadrumanous ancestors as they swung nimbly down the forest aisles. Here goes, anyway! and I approached the tree. Somehow it didn't look so simple as speeling up the drying-green posts at the age of ten; for one thing, it seemed hard to get close enough to the tree to embrace it; but, as soon as I laid my cheek to the bark and threw my arms about the stem, my shins and feet seemed to correlate instinctively, and up I swarmed. Nor was it so much force of gravity that stopped me half way up, as the ludicrous thought of a new chapter in Dickens, adding yet another to the long list of undignified attitudes involuntarily struck by the immortal Samuel Pickwick. Assuredly if anyone

caught me before I caught that chrysalis, I should be haled off to the nearest lunatic asylum. The thought of the chrysalis spurred me up the few feet remaining, and when I did slide down to the ground, it was not empty-handed. The discovery of three more of these pupæ, not many yards further on and within easy reach, was a trifle disconcerting; but if (I reflected) this did eventually prove a new beetle, four specimens were none too many. Little did I know then that hundreds of this creature—a regular colony —were hiding in the bushes just round the corner, chuckling up their sleeves, probably, at the amazing spectacle of Pickwick heaving his bulk up a butternut tree. Its very name, when I came to discover it, seemed a piece of mocking irony—*Anatis*, the Innocent.

I followed the path along to the north end of the wood, through a belt of cedars, to look at a fine colony of Adders' Tongue Fern, and then turned west. After skirting the edge of the wood for a space, the path presently dipped in again among the trees. Here and there I passed a glade grown up with Early Elder, and suddenly was arrested by a gleam of bright prussian blue and yellow among the leaves. This contrasted colour-scheme characterizes one of the moths as well as a Lampyrid beetle; and more than once I had been disappointed in this way, when I fancied myself stalking and about to bag the famous Elder-borer (*Desmocerus palliatus*). But to-day must have been my lucky day, or some of the Little People had admired my efforts at tree climbing and were determined to reward me as only fairies can. It was no changeling grass-moth or fire-fly this time, but the genuine Knotty Cloak. On the same shrub I found a pair of these borers a moment later, and in the little glade, among the thickets of Elder, I captured seven specimens of this beautiful beetle in about an hour—always on the under side of the foliage or crawling on the stem. I don't think I looked for any thing else all the afternoon than the Early Elder, and I returned home with fifteen of the beetles. Once I knew where and when to look for the Elder-borer, it became a common capture. That season I took over seventy, between June 20 and July 25, nearly always on Early Elder growing in woodland glades, and generally on the foliage. It is not so frequent a borer in the Late Elder, and I have never found it on the flower-clusters of that plant, which blossoms at the end of June.

APHIDIDÆ FOUND ON THE APPLE IN BRITAIN AND THE DESCRIPTION OF A NEW SPECIES FROM AFRICA.

BY FRED. V. THEOBALD, M.A.

(Continued from page 177.)

Aphis kochii Schonteden (nov. nom.).
Aphis pyri Koch (non Boyer de Fonscolombe).
Aphis sorbi Walker, Sanderson, etc. (non Kaltenbach).
Aphis mali Buckton (part) (non Fabricius).
Aphis pyri-mali Fabricius (part).
Aphis malifoliæ Fitch* (and Thomas).
Myzus mali Ferrari (part).
Aphis pyri Gillette and Taylor (non Boyer).†

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NOTE.—Joshua Major, in his "Treatise of the Insects Most Prevalent on Fruit Trees, Etc." (p. 10, 1829) mentions Apple Aphides of various kinds, and evidently refers to this species, and not to *A. avenæ*, as has been suggested.

*Oestlund (Aphid. Minn. p. 64, 1877) thinks this a variety of *mali* but his *mali* is certainly *avenæ*.

†Gillette and Taylor called this *pyri* after Koch's description, but Boyer's *pyri* antedates Koch's.

Description.

Alate viviparous female (spring form).

Head black. Thorax shiny black. Abdomen dull reddish of various shades at the base, sometimes yellowish red, with four black lateral spots and a black area on the posterior region, with 3-4 lateral tubercles before the cornicles. Antennæ black, not quite as long or nearly as long as the body; first segment longer than the 2nd; the 3rd with many sensoria over its whole length (47-60); the 4th scarcely longer than the 5th, with many sensoria over its whole length (27-35); the 5th with 3-0 sensoria on the basal ¾ and the usual sub-apical one; the 6th a little longer than the 3rd; the last three segments imbricated. Cornicles black, cylindrical, moderately long, imbricated. Cauda small, dusky. On the 7th and 8th abdominal segments are two pairs of dorsal tubercles. Legs with yellowish-brown trochanters; bases of femora and tibiæ pale, apices of the same dark. Wings with brownish veins and paler insertions; venation often very variable.

Length—2 to 2.5 mm.; wing expanse, 7-8 mm. Sanderson says "abdomen yellowish-red," and figures it with only four pairs of dark lateral spots. All European specimens have a large dark abdominal area, as in the return migrant.

Alate viviparous female (return migrant).

Head and thorax black. Abdomen reddish, with a large dark dorsal area of various extent, often extending from close to the thorax up to the cornicles,* at others time quite small; black transverse bars caudad of the cornicles, and three large black lateral spots before the cornicles and traces, more or less distinct, of one caudad of them. Antennæ black and similar to the spring form. Legs and cornicles the same as the spring form. No trace of the four tubercles on segments 7 and 8 of the abdomen, according to Sanderson; but I have found them in all British specimens I have examined. Rostrum reaches to the second pair of legs. Cauda dark, small.

Apterous viviparous female.

Colour varying from slaty-grey to bluish black, plum colour, brown, brick-dust red, pink, rosy and almost black. The young

*Now and then almost black specimens occur.

may be yellowish pink, some bright pink, to brick-dust red; others almost green, or yellowish green. A few mottled or darkened at the sides. The mature female is usually a slaty-grey or dull bluish black covered with much whitish meal; form globular.

The pronotum has two blackish tubercles. The abdomen with 5-6 (usually 6) pairs of lateral tubercles; segments 7 and 8 each with two sub-median dorsal tubercles or dark plates. Antennæ as long or slightly shorter than the body, especially in the early broods; 1st segment wider and a little longer than the 2nd; the 3rd the longest in the early broods, about as long as the 6th in the later broods; 4th longer than the 5th; 3rd to 6th markedly imbricated. Cornicles black, rather long, somewhat tapering towards the apex; in others almost cyndrical; imbricated; in certain stages they may be somewhat paler at the base. The 7th and 8th segments of the abdomen show, in some specimens, a darker plate which bears the papillæ. Legs pale grey to pale brownish green, apical half of meso- and meta-femora black, also the tibial tips and the tarsi. Antennæ dark brown, almost white at the base. Probescis reaching to the 2nd pair of legs. Cauda small, dark.

Length—2 to 2.2 mm.

Nymph—Pink, reddish yellow or salmon colour, with fine white mealy covering. Eyes reddish black. Apex of cornicles and wing pads dark. Base of antennæ and legs paler.

Oviparous female.

Apterous, yellow, or lemon-yellow, to greyish or dull greenish yellow; head darkened. Antennæ nearly as long as the body; 1st segment longer and broader than the 2nd; 3rd longer than the 4th, not quite as long as the 6th; 4th a little longer than 5th, about half the 3rd; 6th a little longer than 4th and 5th; its basal area about half as long as the 5th; yellowish to pale greenish; the 5th and 6th segments smoky, markedly imbricated; sensorium on 5 and 6 normal. Eyes large. Cornicles straight, cylindrical, about as long, but thicker than the 4th antennal segment, pale yellowish to dusky yellow, except for the very dusky tip, imbricated and with one or two marked apical striæ. Fore and mid legs yellow or yellowish green, except the tarsi, which are dusky and the tips of femora and tibæ; hind legs with broadened tibiæ, dusky, except at the base, with 45-50 sensoria over the whole surface; tarsi dark.

Proboscis yellow, brown at the tip, reaching to about the 3rd coxæ. Cauda small, pale, blunt, with two pairs of lateral hairs. On the body is a small lateral papilla between the mid and hind legs on each side.

Length—.8 to 1 mm.

Male—Alate. Head and thorax dark, somewhat shiny. Abdomen small, dark in centre, with dark lateral spots, and dull reddish in places. Cauda and anal plate dark. Penis pale yellowish. Antennæ a little longer than body, deep blackish brown; 1st segment larger than 2nd; 3rd long, as long or longer than the 6th, with 45-50 sensoria; 4th longer than 5th, with 18-22 sensoria; 5th with 7-10 sensoria; 6th with flagellum about six times as long as the basal area, which is about one-third of the 5th. Eyes very large, dark. Proboscis rather thin and acuminate, reaching to the second legs; last two segments about equal. Cornicles black, cylindrical, rather narrow, imbricated, with some apical striæ. Legs with coxæ, most of femora, apex of tibiæ and the tarsi dark brown to black, rest dull yellowish green. Wings with brown veins.

Length—1.5 mm.

Food Plants.—All varieties of Apples and Pears, mostly on former in Britain; the Medlar; Walker records it from *Cratægus oxyacantha, Sorbus aucuparia* and *Sorbus domesticus;* Passerini on *Sorbus torminalis*. These latter records, I expect, all refer to the true *Aphis sorbi*.

Distribution.—All over Britain, but especially in the Midlands, east, south and west; most parts of Europe, North America, Africa, and apparently in Australia.

Life-history in Britain.

This species hatches out in April, any time between the second week and the end of the month. It at first lives freely on the tops of the bursting buds and then enters them. As the buds open out, it continues to live freely on the young leaves and on the young and tender growth generally. To some extent the young foliage may shelter it. As the insect matures into the "Mother Queen," the leaf may either curl up and partially enclose her, or she may remain exposed beneath the leaf. This "mother-queen" soon produces living young, and often with great rapidity; and these, as

they grow, cause the leaf to curl right up and enclose them—the curled leaf frequently becoming a living mass of apteræ. By their constant sucking the foliage becomes more and more contorted, and eventually, both from the sucking of the insects and their excrement, which seems to have a scorching effect, the leaves turn brown, and may or may not fall off. Not only does this aphis feed on the leaves at the top of the shoots, but also on the shoots, and the result is contorted and stunted growth. The internodes are shortened, and consequently a very "stubby" appearance is produced, especially in young stock.

The first alatæ I have found occurred on June 13th, 1899, and I have found them onwards until 29th of July, in 1914. Although these Plant Lice become alate in masses, a few always occur some time before the main swarm, and others later. The winged females are very sluggish, and, like those of *Aphis rumicis*, collect together in masses, usually choosing the underside of a fairly large branch of the tree near its junction with the trunk. Many of these groups of alatæ were noticed in 1915 to die off and remain attached to the branches. This winged summer generation flies off in July, but where to I have been unable to trace. It dies out on the apple and pear from mid-July. In the beginning of September a few return migrants may appear, but the majority in October. These produce the sexual generation of apterous oviparous females and alate males. The sexuparæ may occur on into mid-November, and I have several times found the oviparous females in the first week in December. The females and males occur under the leaves, and, when fertilized, the females crawl to the shoots and lay their eggs either singly or in small groups; never in dense masses as is done by *Aphis pomi*. Many of the oviparous females fall to the ground with the ripe leaves before they have oviposited. These may lay their ova on the leaves as they lie upon the ground. The ova are at first yellowish, but soon become the normal shiny black.

I have vainly tried to trace this species to other plants this last six years. Weeds and their roots have been searched, to no avail. Recently, W. R. Ross writes me that he has found *sorbi* of the apple on the roots of *Plantago* in summer in Canada.

In one or two localities I have noticed that the attack of this

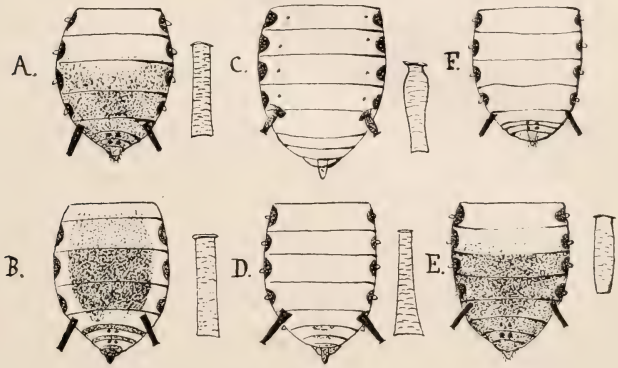

Fig. 4.—Bodies of Apple Aphides. A, *Aphis kochii* Schonteden (spring migrant). B, *A. kochii* Sch. (autumn migrant). C, *Siphocoryne avenæ* Fabr. D, *Aphis pomi* De G. E, *A. cratægi* Kaltenb. F, *A. kochii* (*sorbi* of Sanderson) spring migrant (after Sanderson).

Fig. 5.—Antennæ of alate viviparous female Apple Aphides. A, *Aphis kochii* Schonteden, 13, V, '12 (spring migrant). B, *A. Kochii* Sch., 5, IX, '12 (return migrant). C, *A. pomi* De G., 17, VIII, '12. D, *A. cratægi* Kaltenb. E, *Siphocoryne avenæ* Fabr., 14, X, '15 (spring migrant). F, *S. avenæ* Fabr., 7, IX, '15 (return migrant).

aphis is very marked, for the leaves become deformed in a blister-like manner, the damaged areas being coloured a rosy or pallid yellow tint. This appearance, to some extent, resembles that caused by *Aphis cratægi* Kalt. I first noticed this in the Marden area in Kent in 1907, and in recent years in my own garden on an old Cyder Apple. Ants were found carrying the aphides down this large tree to some espaliers below, viz., Lord Suffield, Peasgood, Bramley Seedling and Cox's, but the effect caused by the aphides on them was quite normal. This shows that under certain conditions and on certain varieties the effect of this aphis varies. Walker records *A. sorbi* as appearing in thick clusters on *Sorbus domesticus* near London in 1847, giving the leaves autumnal red and yellow tints; this record again may refer to true *sorbi*. In some years in Britain *Aphis kochii* does enormous harm—perhaps 1915 has been the worst year of all. Many orchards were quite ruined by it, the foliage scorched, and in very many the fruit badly deformed by the punctures of the aphides, and consequently of no commercial value. In one plantation visited, which had been banded with Tanglefoot, but not sprayed, the insects swarmed all over the trunks and the bands were completely covered with thick layers of them. Some were found crawling up, others down the trees, all being apteræ or nymphæ. On July 4th this wandering ceased, and the majority commenced to become winged, many of the alatæ died on the trees, many others flew away.

Variation in colour.—I know of no aphid which varies so much in colour in the apterous stage. In one district they may all be slaty-grey, in another all bluish black, and locally called the "Blue Bug," in others most are plum colour or brown, but all have a small sprinkling of pale reddish or pink forms with them and called the Rosy Aphis; now and again this alone occurs. In some cases I have found colonies a dull brown, very similar to Koch's figure of his *Aphis pyri*.

Natural Enemies in Britain.

Towards the end of June a few *Coccinellidæ*, many Syrphid larvæ and now and then a Chrysopid larva may be found feeding on this insect. By the first week in July they become more abundant, and by the second week, as a rule, these "natural checks" seem to have obtained the ascendency over the "Dolphins."

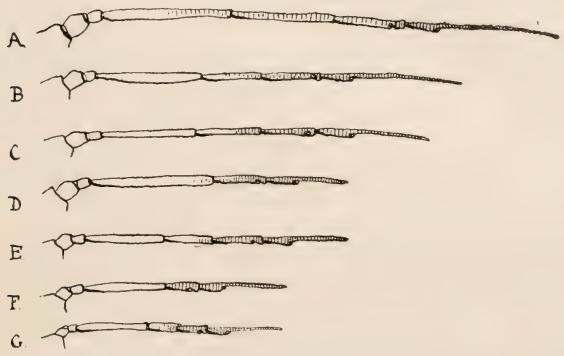

Fig. 6.—Antennæ of apterous viviparous female Apple Aphides. A, *Aphis kochii* Schonteden. B, *A. sorbi* Kaltenb. C, *A. pomi* De G. D, *A. cratægi* Kaltenb. E, *A. oxyacanthæ* (=*nigra* nov. nom.) Koch. F and G, Siphocoryne avenæ Fabr., 1st and 2nd series.

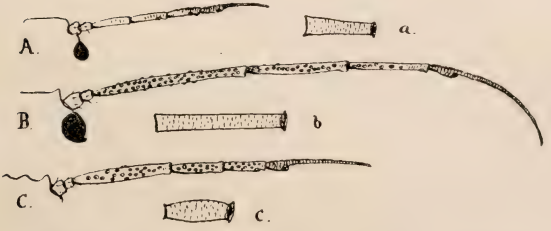

Fig. 7.—Males of Apple Aphides. A, Male *Aphis pomi*; a, cornicle. B, Male *A. kochii*; b, cornicle. C, Male *Siphocoryne avenæ*; c, cornicle.

By this time, however, all the damage has been done. Very few seem to be struck by Chalcid parasites, but I have bred one species on two occasions. The chief enemies are the *Adalia bipunctata* and *Coccinella septem-punctata*. The chief syrphids I have bred have been *Syrphus ribesii* and *Catabomba pyrastri*, but I have found several other larvæ feeding on them, including *Syrphus grossulariæ*. Spraying has little or no effect on this pest when once the leaves are curled. Nicotine-soft soap wash is the only one that shows any appreciable effect, and growers retain their nicotine for this purpose, but it is not nearly effectual enough to clean the trees, as so many lice are not hit owing to the dense leaf curling. Early spraying with nicotine and soap has, however, in many cases checked the damage. The best results I have seen have been with late lime spraying, just before the blossom opens. In small plantations and gardens stripping the curled leaves on bush trees has produced excellent results, and also autumnal spraying to kill the sexuales.

Aphis cratægi Kaltenbach (non Buckton).

Kaltenbach, Mono. Pflanz., p. 66, 1843.
Tullgren, Upp. Prak. Ent. XVII, pp. 59 and 76, 1907.
Theobald, Entomologist XLIV, p. 403, 1911.
Theobald, Rept. Eco. Zool., 1911, p. 34, 1912.
Theobald, Entomologist XLVIII, No. 630, p. 259, 5, 1915.

Alate viviparous female.

Black and shiny, with a mealy snow-white band on the base of the abdomen, which varies from a narrow line to a broad band covering the first four segments, but usually only the first two; this band has a white meal orbit above and beneath. The colour to some extent varies; it may be pale yellowish white, pure white or pale pink, more rarely with an indistinct whitish green hue, and on this pale area are a few paired dusky marks or spots; five pairs of lateral black papillæ before the cornicles. The posterior of the abdomen may be a pale colour, with narrow transverse dark bars, and there are two sub-median papillæ behind; venter pinkish to pinkish white, and also to some extent mealy. Antennæ shorter than the body, black; the 3rd segment with 64-70 sensoria; 4th with 25 to 30 sensoria; 3rd thick and longer than the 4th; 4th about as long as the 5th. Eyes dark brown. Proboscis yellowish, apex black, reach-

ing nearly to or quite to the 3rd coxæ. Cornicles rather short, black to deep brown; imbricated, cylindrical, or slightly expanding at the base, a few constricted at the apex and base. Cauda black or brown, blunt, with two pairs of lateral hairs. Legs black, except the base of the femora, which are yellowish. Base of wings yellowish; stigma and veins greyish brown to brown.

Length—1.8 to 2 mm.

Apterous viviparous female.

Deep greyish green to almost black, with much mealy covering, and, when denuded of this, the insect is somewhat shiny. Antennae

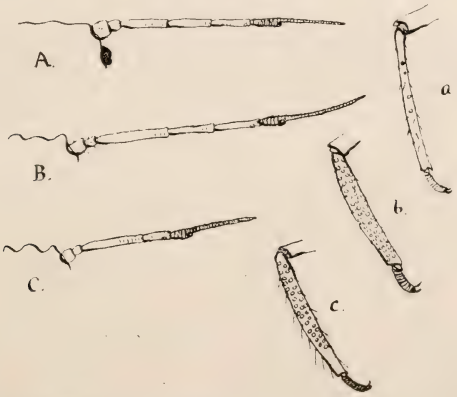

Fig. 8.—Oviparous females of Apple Aphides. A, *Aphis pomi*; a, hind tibia. B, *A. kochii*; b, hind tibia. C, Siphocoryne avenæ; c, hind tibia.

shorter than the body, base paler than the rest, composed in all the specimens I have seen of 5 segments only; the 3rd very long; the 4th less than half its length; the 5th with a short flagellum. Eyes deep brown to black. Proboscis greenish, apical half almost black, reaching to the second pair of legs. Venter deep greenish. Cauda black to brown. Cornicles short, black; in some the base is reddish yellow. Legs black.

Length—2 mm.

Nymph.—Two forms occur, one pale to deep green, mealy,

with dark legs and cornicles; the other fawn coloured and mealy, with dark wing-pads and eyes. Legs and cornicles dusky.

Distribution.—Windermere, Cumberland, 23, V, 14 (Rymer Roberts). Marden, V, 07, and Wye, Kent, V, 10 (Theobald). Haddenham, Cambs, VI, 05 (Theobald), and Mortimer, Berks, V and VI, 11 (Lake).

Food Plants—*Pyrus malus*, *Pyrus communis* and *Cratægus oxyacantha*, etc.

Observations.—Described by Kaltenbach from Apple, Pear and Hawthorn. I have found it and received it from apple in England and often on hawthorn in Kent. It produces a very marked appearance, causing the leaves to become blistered. The blisters assume a rosy red to deep red hue; when on apple, yellow and red. The leaves curl downwards, and under those galled areas the insects live and reproduce. Sometimes the mid-rib region is galled; at others almost any part may be deformed; this is especially so on the hawthorn. It does not appear to be a commonly distributed species, anyway in the south and midlands. It was sent me from Mortimer in 1911, where Mr. Lake found it in abundance on Lane's Prince Albert apple. It is a very marked species, easily distinguished when alate by the white basal abdominal band when alive, and by this area being pale when the mealy covering is removed. The apteræ, in certain lights, appear quite black; in others a distinct grey-green, with dark legs, antennæ and a mealy coat. They are also flatter than the other dark species found on the apple (*nigra*, *rumicis*, etc.). Schonteden (Mem. Soc. Ent. Belg., XII, p. 226) places this species as a synonym of Boyer de Fonscolombe's *Aphis pyri*, which I cannot help thinking is incorrect.

Fonscolombe expressly states that the abdomen of the alate female is "Verdâtre, avec une bande brune un peu confuse de cheque côté; quelquefois presque tout brun; les tubercules lateraux sont verdâtres." The sexuparæ are not known.

Alatæ hatched from May 22nd to May 30th; they were very active. It is not known to what tree or plant they migrate. It is usually seen late in May and June, and continues to July. Buckton describes quite a distinct Aphis as Kaltenbach's *Aphis cratægi*, the apterous female being bright green and slightly mealy,

the alate female with bright green abdomen. I have already renamed Buckton's species *cratægiella* (Entomologist, XLIV, p. 4, 13, 1911). Passerini also describes an *Aphis cratægi* which is distinct, for he says it has "rusty red spots at the base of the cornicles."

Koch places Kaltenbach's *cratægi* as a synonym of Fonscolombe's *Aphis pyri*, but, as shown here, Koch's species is distinct.

(To be continued).

THEODORE PERGANDE.

News of the death of Theodore Pergande, which occurred on March 23, 1916, came as a shock to Canadian entomologists who have had the pleasure of meeting him and discussing questions relating to insect life. For a number of years, as we all know, his life had not been a very active one. During my last short stay in Washington I was unable to see Mr. Pergande, but I well remember my first visit to the Bureau of Entomology in 1901, when I frequently had the pleasure of meeting him and discussing matters of mutual interest. His liking for my late friend and associate, James Fletcher, was indeed genuine, and this undoubtedly opened the way for a more than passing interest in my visit.

From the Monthly Letter of the Bureau of Entomology, U. S. Department of Agriculture, for March, 1916, we learn that Pergande was born in Germany on December 28, 1840. He came to the United States at the time of the Civil War, and before very long entered the Northern army, serving throughout the war. Afterwards he secured a position as assistant to Prof. C. V. Riley, who at that time was State Entomologist to Missouri. When Riley was appointed Entomologist of the U. S. Department of Agriculture, in 1878, he took Pergande with him to Washington; and the latter for many years had direct charge of the rearing work, kept the notes, and made the great majority of the biological investigations upon which the entomological publications of the Department were based. Important results of his studies have been published as bulletins from the Bureau at Washington. His

publications, especially on the Aphididæ, are well known. "The Life-history of Two Species of Plant-lice inhabiting both the Witch-hazel and Birch," issued as Technical Bulletin No. 9, is a remarkable contribution, and one which took nearly twenty-two years of patient labour to complete. Two other important publications are "The Life-history of the Alder Blight Aphis," issued as Technical Bulletin No. 24, and the "North American Phylloxerinæ Affecting Hicoria (Carya) and other Trees." This latter, published in Volume IX of the Proceedings of the Davenport Academy of Sciences, comprises pp. 185 to 273, accompanied by 21 plates. It is, indeed, a valuable contribution. The Entomological Society of Ontario occasionally received from Mr. Pergande short articles for publication in this journal.

The death of Mr. Pergande, who was the oldest assistant, in continuous service, in the Bureau of Entomology, Washington, D.C., took place after a brief illness of less than two weeks. The work he accomplished during his long engagement in the service of the United States Government will long be appreciated. We, in Canada, were indeed sorry to learn of his demise.

ARTHUR GIBSON.

NOTES AND QUERIES.

INHABITANTS ON AN APRIL MUD PUDDLE.

On the afternoon of April first I determined to start out on the initial 1916 collecting trip in spite of the ice on the pond nearby and the still lingering snowdrifts in the woods.

Wading along in the open water, at the edge of the pond, I started out a few *Peltodytes* (*Cnemidotus*) and *Hydroporus*, and discovered a couple of *Matus bicarinatus* on the under side of a board. Passing on up the hill, after investigating a shallow pool at the foot without success, through the oak scrub to an abandoned gravel pit, I came upon a small puddle of water about two inches deep and six feet square. After stirring this up and taking a few *Hydrobius fuscipes* and one *Hydroporus tristis*, I proceeded to tread the few inches of soft earth into a mass of mud and water, with the following surprising results, which came floating to the

surface of the mixture: One *Tachys lævus* Say, seven *Tachys granarius* Dej., one *Amara cupreolata* Putz., two *Agonoderus testaceus* Dej., many *Stenolophus conjunctus* Say, several *Helophorus lineatus* Say, one *Ilybius biguttalus* Germ., one *Phelister subrotundus* Say, three *Cytilus (sericeus) alternatus* Say, two *Heterocerus brunneus* Melsh., one *Atœnius imbricatus* Melsh. (my first record for this), four *Aphonus castaneus* Melsh., two *Graphops curtipennis* Melsh., one *Graphops marcassita* Cr., twelve *Dyschirius* sp., seven *Aleocharinæ* sp., one *Aleocharinæ* sp., two *Stenus* sp., two other *Staphylinidæ* sp., two species of ants, several spiders, two plush-covered caterpillars, two larvæ, one chrysalis, and one small Dipteron that appeared at home on the surface of the water.

The only vegetation here was some moss or lichens and a few spears of grass. Several much more favourable looking places failed to yield a single specimen other than *Hydrobius fuscipes*.

The catch numbered 60 odd specimens of 21 species representing 19 genera and 9 families of the Coleoptera alone.

C. A. Frost,
Framingham, Mass.

Aphids on California Privet in New Jersey.

As a rule, California privet (*Ligustrum ovalifolium*) enjoys unusual freedom from insect attacks in New Jersey, even though it becomes infested with *Aleyrodes citri* Riley & Howard in the southern states and the San José scale in California. In New Jersey white grubs (*Lachnosterna* sp.) have been found injuring the roots, and occasionally a stray San José scale is discovered, but on July 15, 1915, a privet hedge in Jersey City was found to be infested by plant lice. The upper surfaces of the leaves were characteristically discoloured, some being quite yellow and the foliage of the infested plants had a peculiar limp appearance instead of being twisted and curled. Specimens were sent to Prof. C. P. Gillette and determined by Mr. L. C. Bragg as *Rhopalosiphum ligustri* Kalt. They also stated that they believed this to be the first record of the occurrence of this species in the United States.

Harry B. Weiss,
New Brunswick, N. J.

ODONATA AND EPHEMERIDÆ.

Contributions to Canadian Biology, being studies from the Biological Stations of Canada, 1911-1914, Fasciculus II—Fresh Water Fish and Lake Biology. Supplement to the 47th Annual Report of the Department of Marine and Fisheries; Fisheries Branch. Ottawa, 1915.

In this "Blue book," issued by the Dominion Government, there is a series of thirteen important papers dealing with the aquatic fauna and flora of the eastern coast of the Georgian Bay in Ontario. They are published in this way in order to extend the knowledge respecting the available food for fishes in these waters, their parasitic enemies and other matters of biologic interest. Three papers deal with aquatic insects. The first is by Dr. E. M. Walker on "The Odonata of the vicinity of Go Home Bay," in which he records his observations on the Dragon and Damsel flies to be found in the neighbourhood of the Biological Station, with descriptive notes on more than sixty species. The article is illustrated with two plates of structural details, five views of the characteristic scenery, and a plan showing the seasonal distribution of the species—the whole forming a most valuable contribution to the knowledge of the life-histories of these attractive insects.

The other papers of an entomological character are by Mr. W. A. Clemens of the Univeristy of Toronto, and are entitled, "Rearing Experiments and Ecology of Georgian Bay Ephemeridæ" and "Life-histories of Georgian Bay Ephemeridæ: observations on Heptagenia and breeding experiments." In the former paper twenty species are referred to and many of them described; and in the latter, which deals only with a single but largely represented genus of May-flies, there is given a key to the imagos and descriptions of the nymphs and their life-histories. Six plates of nymphs and details of structure add much to the value of the papers. These insects, which are often to be found in enormous numbers, supply a very important part of the food of many fishes.

C. J. S. B.

Mailed June 9, 1916.

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POPULAR AND PRACTICAL ENTOMOLOGY.

A Few Days in Newfoundland.

BY E. M. WALKER, TORONTO.

In the summer of 1914 I had the opportunity of spending a few days in Newfoundland, which I had long wished to do, for I had heard enough about its beauty and the peculiarities of its fauna and flora to arouse within me a strong desire to see some of these things for myself.

Unfortunately I had but five days to spend on the island and two of these were cold and wet, so that the chief result of my trip was a greatly increased desire to go there again.

My main object was to collect and observe the dragonflies, particularly of the genus Somatochlora, the species of which are nearly all inhabitants of the far north, and are consequently less known than those of any other North American genus of the order Odonata. A collection of dragonflies made by Dr. D. A. Atkinson at the Bay of Islands and Grand Lake, Nfd., and recorded by Mr. E. B. Williamson (Ent. News, XVII, 1906, pp. 133-139) was so rich in species of this genus that I had little doubt that I could obtain a good series of them even in a few days. So I planned to go at once to the Bay of Islands and spend there the few days that I had at my disposal.

Leaving North Sydney on the night of June 24th, I arrived at five o'clock on the following morning at Port aux Basques on the southwestern corner of Newfoundland, and immediately boarded the train which was to take me to my destination, Humbermouth, on the Bay of Islands, about 120 miles up the west coast. (I might almost have said "embarked" on this train, for the trip was more like a rough sea voyage than a railway journey.)

Port aux Basques is a quaint little fishing village, and I longed to spend a day there, but could not afford the time. The low, rounded, treeless hills, enveloped in mist, the stunted vegetation

and great stretches of moors had a semi-arctic aspect suggestive of the tundra or barren-grounds of the far north, and I have no doubt they would prove of great interest to the entomologist. Though treeless, patches of dwarfed spruce, not more than two or three feet high, occupied the more sheltered slopes, and these became more frequent and of gradually increasing height as the train drew away from the coast.

In a very short time groups of stunted, gnarled trees began to appear, most of them so windblown and fantastically shaped as to be scarcely recognizable. They were mostly spruce, tamarack and balsam poplar. I noticed here and elsewhere that the tamarack has apparently never been attacked by the larch saw-fly (*Nematus erichsonii*), which has probably devastated the entire area occupied by this tree on the continent, and it is to be hoped that Newfoundland, at least, will be spared the ravages of this destructive pest.

The greater part of the country through which we passed on the way to the Humbermouth consists of vast swamps and bogs, sometimes densely wooded with black spruce, but in the wetter parts supporting only a scattered growth of stunted trees of this species and of tamarack. Here and there we had glimpses of beautiful bog flowers, and at one spot where the train stopped one could have gathered bunches of that magnificent orchid, the Showy Lady's Slipper (*Cypripedium reginæ*), close to the railway track. The vegetation along the railway was in some places extremely rank, one of the commonest plants being the cow-parsnip (*Heracleum lanatum*), which, though a tall stout plant with us in Ontario, is far larger in Newfoundland, the usual height being seven or eight feet. It is likewise far more abundant, and, in fact, is regarded there as a troublesome weed.

On account of the boggy character of this country, very little of it has been cultivated, although, when properly drained and treated with lime, it produces a fine growth of timothy and other crops.

The monotony of these bogs is frequently relieved by hills, magnificent ravines and gorges in which the vegetation is sometimes so rank and vigorous as to recall British Columbia. These

ravines are well timbered with tall white spruce, balsam-fir, yellow and white birch and balsam poplar, with occasional specimens of our familiar white pine, and the dense undergrowth, a luxuriant tangle of shrubs, ferns and flowering plants, makes a most alluring sight to an entomologist. In all of these ravines there are clear rushing streams, many of them no doubt teeming with salmon and speckled trout.

During the course of the trip I had the usual tantalizing experience of passing innumerable ideal-looking spots for dragonflies; ponds, pools, and lakes of all sizes, some dark and bog-margined, others shallow and reedy, all of them inviting.

Humbermouth, my destination, was reached about 3.30 p.m. and, from a picturesque standpoint, no finer spot could have been selected as the terminus of my trip. The broad Bay of Islands, surrounded by majestic wooded hills and the clear rushing waters of the beautiful Humber, just beyond the village, were thrilling in their peaceful grandeur; but I soon determined from the topography of the country that this was no place for dragonflies, so on the following day, which was cold and wet, I again took the train southward and got out at Spruce Brook, which I had noted on the way as a promising locality.

Spruce Brook is a famous resort for salmon fishing, and the Log-cabin Hotel is one of the most delightful places I have ever visited. In such a remote spot I was not prepared for the modern conveniences which I found there, and the kindly interest and courtesy shown me by the proprietors, Messrs. Whittington and Dodd, were of material assistance in enabling me to make the most of the few days I spent there.

The Log-cabin Hotel is situated on the shore of a beautiful lake in a broad valley, flanked by low wooded hills. The land in front of the hotel is largely cleared and partly cultivated, but on all sides there are rich woods, with streams, marshes and ponds within easy reach. The flora is very luxuriant and apparently abundant in species, so that the entomological outlook seemed full of promise. In this, however, I was doomed to disappointment.

I lost no time in looking up a promising place for dragonflies. I was directed to a small pond, nearby, with a marshy shore and connected with Spruce Brook itself. The weather was dull and

wet, and it was getting late, so that I was not discouraged in finding only a few specimens of *Cænagrion resolutum*, a little pale blue damsel-fly, which is widely distributed across Canada and already known from Newfoundland. I also took from the creek a single nymph of a *Lestes*, apparently *unguiculatus*, and one of *Æshna umbrosa*, neither of which had been previously reported from the island.

On the following day I found a small lake, a mere expansion of a trout stream, the upper end of which was bordered by an open marsh covered with short sedges and similar marsh plants. It looked favourable, but dragonflies were exceedingly few, *C. resolutum* being the only species that could be called common. *Enallagma calverti*, another blue damsel-fly of wide distribution in the north, was taken in small numbers, and I also got two specimens of *Somatochlora albicincta*, the first of the genus which formed the chief objective of my trip. The most interesting find, however, was another little *Cænagrion*, of which I had taken a pair the preceding year at Nipigon, Ont., and which proved to be the *Agrion interrogatum* of Selys, previously known only by a single imperfect female from Saskatchewan, described in a Belgian journal 40 years ago. (See Can. Ent., XLVII, 1915, pp 174-181). I searched here for more specimens of this rarity on this and the following day, but succeeded in getting only two more specimens. Along the wood road leading to this lake from the railway a few large dragonflies of the genus Æshna were occasionally seen, but they were so few that I considered myself lucky to have captured one of them. It was *Æshna interrupta* E. Walk., another species of transcontinental range.

This lumber road was a good general collecting ground, but collecting was difficult owing to the swarms of black flies (*Simulium venustum* ?), "punkies" or sand-flies (*Culicoides* sp.) mosquitoes and deer-flies (*Chrysops*). I collected a few of the latter which were kindly determined for me by Mr. M. C. Van Duzee, and I was surprised to learn that five species were represented among them, viz, *C. mærens* Wlk., *C. frigidus* O. S., *C. celer*, O. S., *C. excitans* Wlk., and *C. mitis* O. S. The only other Tabanid I noticed was the common *Tabanus affinis*, of which I took but one specimen.

On the afternoon of my third day at Spruce Brook I determined

to visit a certain marsh at the far end of a lake about half a mile long, which lies between densely wooded hills not far from the hotel. In order to reach it I had to struggle through a dense black spruce swamp extending the entire length of the lake. Now a black spruce swamp is always enticing to me, but on this occasion I had had enough of it by the time I reached the marsh, without the return trip, and the worst of it was that when I did arrive there no dragon-flies were to be seen, except a very few of *C. resolutum* and *E. calverti*.

It was here though, and at the other marsh, that I found the sole representatives of the Order Orthoptera which I came across in Newfoundland. These were a very few young nymphs of *Chorthippus curtipennis* Harr., one of the most common and widespread of Canadian grasshoppers. The season was certainly very backward, but, in spite of this, one would have expected to find at least the nymphs of the commoner grasshoppers in the fields and clearings. I searched for these in vain, however. Morgan Hebard has recently published a list of six species of Orthoptera from Newfoundland (Ent. News, XXV, p. 306, 1915), two of which (*C. curtipennis* and *Melanoplus fasciatus*) were already known to occur there, and my colleague, Dr. A. G. Huntsman, brought me three species from the Bay of Islands, taken in 1915, and all included in Mr. Hebard's list. Our commonest field grasshoppers, *Melanoplus femur-rubrum* and *M. atlanis*, are unknown in the island, and it is quite probable that they do not occur there. No crickets have been taken and only one long-horned grasshopper or "stone-cricket," *Ceuthophilus terrestris* Scudd. The absence of these common and widespread insects is interesting, but it is only part of a general condition characteristic of this island, of which I shall have more to say later.

(TO BE CONTINUED).

SOME NEW RACES AND SPECIES OF NORTH AMERICAN LEPIDOPTERA.

BY WM. BARNES, M.D., AND J. McDUNNOUGH, PH.D.

DIURNALS

Basilarchia arthemis rubrofasciata, subsp. nov.

A series before us of 6 ♂'s and 1 ♀ from Northwestern Canada shows certain constant points which we think warrants

the bestowal of a racial name. In typical *arthemis*, which we might point out was described from New York (probably vicinity of New York City), the submarginal band on underside of secondaries consists of a series of red spots, separated from the marginal green lunules by a well defined black area; in this new race this submarginal area is occupied by a continuous reddish band extending completely up to the green lunules and only separated from the interior white band by a narrow line of black; the basal area is also largely suffused with reddish, making the three red spots near base of wing much less distinct than in the typical form. On the upper side the ground colour is a dead black and the red submarginal spots of secondaries are large and with scarcely a trace of green edging on their inner side. It is this form that is figured by Say from Lake Winnipeg, which is apparently about the eastern limit of the race.

Types—One ♂, Saskatchewan (Croker); five ♂'s, Cartwright, Man.; one ♀, Calgary, Alta. (Dod) in Coll. Barnes.

Junonia coenia nigrosuffusa, subsp. nov.

The smoky-black Arizona form of *cænia* has been generally and wrongly listed as *negra* Feld., which was described from specimens taken on the Rio Negro in Northwestern Brazil and which is evidently a form of the S. American *lavinia* Cram., distinguished by its metallic green shaded secondaries. We propose the above name for the Arizona race, which has in general the maculation of typical *cænia*, but the whole upper surface suffused with black-brown, rendering the white subapical banding very obscure; the eye spots of the secondaries are often considerably reduced in size as compared with those of the northern *cænia*.

Types—Three ♂'s, Palmerlee, Ariz.; two ♂'s, Babaquivera Mts., Ariz.; one ♂, Huachuca Mts., Ariz.; one ♀, Arizona, in Coll. Barnes.

Brenthis aphirape dawsoni, subsp. nov.

Specimens from Hymers, Ont., show several points of difference from Labrador specimens (typical *triclaris* Hbn.). The upper side has a deeper brown colour, with a strong suffusion of black, especially along the outer margin, where the brown lunules are

almost entirely effaced; the submarginal row of black spots is very large and there is a tendency for these spots to lengthen out and touch the marginal black area; they are preceded by a well defined black suffusion, which is usually very faint in Labrador *triclaris*. On the underside the median band of secondaries is strongly silvered and stands out prominently against the leathery-brown background, which is slightly deeper in tone than that of Labrador specimens. We take pleasure in naming the race after Mr. Horace Dawson, who by his conscientious collecting has greatly added to our knowledge of the lepidopterous fauna of Northwestern Ontario.

Types—A long series of ♂'s and ♀'s from Hymers, Ont. (June 15-30) in Coll. Barnes.

Brenthis chariclea grandis, subsp. nov.

This form from Hymers, Ont., bears the same relation to *chariclea boisduvali* Dup. from Labrador that *aphirape dawsoni* does to *triclaris* Hbn. It is considerably larger than typical *boisduvali*, the ♂'s averaging 40 mm. wing expanse as compared with 35 mm. in the latter form; the black marginal border is heavier and the submarginal black spots larger with a tendency to become elongate and join the marginal band. On the underside the apex of primaries is heavily and broadly suffused with deep purple, with scattered yellowish markings, and on the secondaries the area beyond the median band of spots is almost entirely of the same deep rich purple colour, with at most only traces along the veins of the paler yellowish shading found in *boisduvali*.

Types—A long series of ♂'s and ♀'s from Hymers, Ont. (Aug. 1-15, Dawson) in Coll. Barnes.

Lycæna rita, sp. nov.

♂.—Upper side brilliant violet-blue, with a narrow black border to both wings about 1 mm. wide, that of the secondaries tending to break up more or less into isolated spots shaded slightly with orange internally near the anal angle; fringe white, faintly checkered with black. Beneath creamy white, with a distinct black marginal line to both wings and checkered fringes;

primaries with a rather faint marginal row of oblong spots, reaching neither the costa nor the inner angle, followed by a row of six large black spots almost joined to form a continuous band; the usual postmedian row of spots large, black, much excurved opposite the cell, and almost touching the submarginal row; a broad black dash in the cell and a series of three small subbasal spots. Secondaries with a marginal row of six black spots and a submarginal row of black dashes of which the two costal ones are heavy and round, the remainder being reduced and rather lunular in shape; between these two rows of spots a broad orange band fills the entire space from anal angle to vein 6; a bent postmedian row of prominent round black spots and a subbasal row of four similar spots with a black discal dash.

♀.—Pale brown above, with a broad orange band on secondaries, much as on the underside, and a more or less distinct row of marginal round spots; occasionally the inner margin of this band shows traces of blue scaling, which may also be found at base of primaries; underside as in the ♂.

Expanse 23 mm.

Types—Three ♂'s, S. Arizona (Poling); one ♂, Santa Rita Mts., Ariz.; one ♂, Rio Verdi Mts., Ariz.; three ♀'s, S. Arizona (Poling) in Coll. Barnes.

The species is closely allied to *enoptes* Bdv., but differs in the whiter ground colour of underside with broader orange band; the spots are also rather heavier and the blue of the upper side more violet in shade; the ♂ genitalia, while quite distinct, show a relationship to *enoptes* rather than to *battoides* Behr., which has totally different sexual organs. We expect to make a few notes at a later date on these much confused species, together with figures to illustrate the points of distinction.

Hemileucidæ.

Hemileuca lucina latifascia, subsp. nov.

Specimens from Manitoba, while agreeing with typical *lucina* from the New England States in the transparent appearance of the wings, have the pale banding very much broader, especially on the primaries, leaving only a narrow black border of equal width

on both wings and much as in *nevadensis* Stretch; from this latter species, apart from their more transparent appearance, they may at once be distinguished by the thoracic vestiture, which is black, not pale yellow, as is found in *nevadensis*. The discal spot of secondaries in the Manitoba race is generally shorter and shows much more tendency to obsolescence than in either *lucina* or *nevadensis*.

Types—Five ♂'s, one ♀, Aweme, Man. (Criddle) (Sept.) in Coll. Barnes.

NOCTUIDÆ.

Ipimorpha viridipallida, sp. nov.

Primaries pale greenish ochre, with the usual markings of the genus, consisting of an outwardly oblique white t. a. line, slightly bent inwards in the central portion, an almost straight t. p. line, slightly angled opposite the cell, a faint and strongly irregular s. t. line defined inwardly by greenish shading, a large round orbicular outlined in white and a similarly outlined upright reniform constricted in the middle; claviform very faintly outlined and appressed to the t. a. line. Secondaries almost pure white, with a faint dark curved postmedian line crossing the central area of the wing. Beneath whitish, with a faint postmedian line crossing both wings.

Expanse 35 mm.

Types—Six ♂'s, two ♀'s, Truckee, Calif. in Coll. Barnes.

Most closely related to *nanaimo* Barnes, with practically identical markings; the pale greenish colour of primaries and the white secondaries readily separate it, however, from this species.

Abrostola parvula, sp. nov.

Thorax gray and brown mixed, posterior tufts light brown. Primaries with basal area to t. a. line brown, shaded with whitish at extreme base; t. p. line geminate, inner line faint, outer sharp, black, slightly angled below costa, rather evenly rounded to vein 1, where it bends outward, forming a slight but noticeable angle; median area dark blackish brown, containing the pale orbicular, subreniform and reniform spots the former two placed obliquely

to each other and joined, forming a figure eight; all the spots with more or less central brown shading, but with no very definite defining lines. t. p. line diffuse, whitish in costal half, geminate and incurved in lower half, the inner line being very distinct and dark brown; three or four black interspaceal dashes below the apex of wing and a white sharply dentate but broken s. t. line preceded by a diffuse narrow brown shade, the apices of the dentations almost touching the outer margin and tipped with brown; fringes slightly checkered by pale dots at ends of veins. Secondaries smoky, paler in basal half in the ♂ with a faint dark median curved line. Beneath smoky, secondaries paler, both wings with discal dot and dark postmedian line.

Expanse 24 mm.

Types—One ♂, S. Ariz. (Poling) one ♀, Redington, Ariz. in Coll. Barnes.

Allied to *urentis* Gn., but considerably smaller. We have other specimens apparently similar to the type from Kerrville, Tex., and Shovel Mt., Texas, which may, however, prove to be a distinct race when more material is available for examination.

THE HEATH COLLECTION OF LEPIDOPTERA.

BY F. W. WOLLEY DOD, MIDNAPORE, ALTA.

(Continued from Page 167).

HETEROCERA.

SPHINGIDÆ.

Hemaris diffinis Bdv. var. *ariadne* B. & McD.

Hemaris thysbe Fabr. One had the fore part of the abdomen green, though in most of the specimens it was yellow. Some with dentate inner edge to the marginal band were separated as var. *cylicciformis*. All these forms grade easily through to one another.

Deilephila gallii Rott.

Deilephila lineata Fabr.

Ampelophaga chœrilus Cram.

Sphinx drupiferarum S. & A.

Sphinx gordius Cram. One specimen.

Sphinx vancouverensis Hy. Edw. and var. *albescens* Teffer.

Sphinx chersis Hbn. One specimen.
Marumba modesta Harr.

Smerinthus jamaicensis Dru. and var. *geminatus* Say. A single specimen in the series was of the typical form *jamaicensis* with the round pupil to the ocellus.

Smerinthus cerysii Kirby.
Paonias excœcatus S. & A.
Paonias myops S & A..
Cressonia juglandis S. & A.

SATURNIIDÆ.

Samia columbia Sm. var. *nokomis* Brodie.
Telea polyphemus Cram.

CERATOCAMPIDÆ.

Anisota virginiensis Dru.

SYNTOMIDÆ.

Scepsis fulvicollis Hbn.
Ctenucha virginica Carp. One specimen.

LITHOSIIDÆ.

Crambidia casta Sanb.
Lexis bicolor Grt.
Hypoprepia miniata Kirby.
Hypoprepia fuscosa Hbn. and var. *plumbea* Hy. Edw. This variety is distinguished by a wide border on secondaries.
Clemensia albata Pack.

NOLIDÆ.

Celama cilicoides Grt.
Nola sp. near *ovilla* Grt. Two specimens. One of these was submitted to Messrs. Barnes and McDunnough, who were unable to give it an exact name, but stated that it was nearest *ovilla*.

ARCTIIDÆ.

Eubaphe immaculata Reak.
Eubaphe spp. Probably *rubicundaria* Hbn. and *quinaria* Grt.
Haploa lecontei Bdv. and vars. *militaris* Harr. and *vestalis* Pack.

Haploa confusa Lyman.
Estigmene acræa Dru.
Estigmene prima Slosson.
Estigmene congrua Walk.
Hyphantria textor Harr.
Diacrisia virginica Fabr.
Isia isabella S. & A.
Phragmatobia fuliginosa Linn.
Phragmatobia assimilans Walk.
Hyphoraia parthenos Harr.
Apantesis virgo Linn.
Apantesis virguncula Kirby.
Apantesis parthenice Kirby.
Apantesis oithona Strk. var. *rectilinea* Kirby.
Apantesis williamsi Dodge, var. *determinata* Neum.
Ammalo tenera Hbn.
Euchætias oregonensis Stretch.
Halisidota tessellaris S. & A.
Halisidota maculata Harr.

AGARISTIDÆ.

Alypia langtonii Coupes. Males of this species stood separately as *octomaculata* Fabr. This error has been a very general one in collections throughout Canada, Lyman going to the extent of publishing an erroneous correction of Holland's figures. In the male sex, *langtonii* and *octomaculata* resemble one another very closely indeed, and both have two white spots on the secondaries, whereas *langtonii* ♀ has only one.

NOCTUIDÆ.

Charadra deridens Grt.
Raphia frater Grt.
Acronycta americana Harr. Females stood correctly, males of the same species standing as *hastulifera*.
Acronycta dactylina Grt.
Acronycta cretata Sm. stood as *leporina*.
Acronycta innotata. The whitest specimens of this stood as *cretata*, whilst some ochreous tinted specimens stood correctly as *innotata*. I thought at first that these latter might be *betulæ* Riley,

but subsequent investigation showed that I was wrong. I have not, so far, seen *betulæ* from western Canada.

Acronycta interrupta Gn. A single worn female.

Acronycta marula G. & R.

Acronycta lobeliæ Gn. Two specimens.

Acronycta manitoba Sm. A series stood correctly named Others stood under *hasta* Gn , whilst three rather large, but otherwise similar, specimens were separated as *telum* Gn. I attached the label to one of these specimens as evidence of what Smith claimed to have at last identified from Manitoba is "the true *telum* of Guenée."

Acronycta radcliffei Harv. Two specimens correctly, and a third rather small one, as "? *tartarea* Sm."

Acronycta quadrata Grt.

Acronycta spinigera Gn. A single female, dated June 23rd, 1910.

Acronycta superans Gn.

Acronycta funeralis Grt. A female, June 27th, 1912.

Acronycta fragilis Gn.

Acronycta grisea Walk.

Acronycta falcula Grt.

Acronycta albarufa Grt.

Acronycta hæsitata Grt. One specimen.

Acronycta inclara Sm. Smith admitted that the aggregate of specimens to which he first gave the name *inclara* (viz., the *hamamelis* of the Monograph) contained a mixture of species. He had made no type, but ultimately fixed Hampson's figure under *inclara* as representing the type of the species.* Unfortunately the figure is a poor one, but I have carefully compared it with specimens in the British Museum, and have not the least doubt as to the species represented. It appears to be fairly common in Manitoba. The Heath collection contained a long and variable series, of which some stood as *inclara;* others as *hamamelis*, and a few small specimens as *modica* Walk.

Acronycta impleta Walk. var. *illita* Smith.

Acronycta sperata Grt. I could see no justification whatever for the attempted separation of the "supposed new species very

*Ent. News, XXII, 309-318, July, 1911.

near *sperata*," which Smith claimed to have discovered from Cartwright, and which was recorded by Heath in his published notes.

Acronycta noctivaga Grt.

Acronycta impressa Walk.

Acronycta oblinita S. & A.

Arsilonche henrici Grt. The North American representative of European *albovenosa*.

Microcælia diphteroides Gn.

Bryophila lepidula Grt. var. *avirida* Smith. Most were the true dull coloured *avirida*, but they graded through to a form nearly as pale, though not quite as bright, as typical *lepidula*.

Bryophila teratophora H. S.

Moma geminata Sm. One of the specimens had a narrow, dark, smoky transverse band, not previously observed in the species.

Chytonix palliatricula Gn. and var. *iaspis* Gn.

Baileya dormitans Gn.

Hadenella tonsa Grt.

Catabena lineolata Walk. One specimen, May 25th, 1911.

Platysenta videns Gn. Amongst this series stood one *Himella contrahens* and one *Orthosia inops*.

Senta defecta Grt.

Balsa malana Fitch.

Athetis (*Caradrina*) *extima* Walk.

Proscenus (*Caradrina*) *miranda* Grt.

Hypocœna (*Caradrina*) *rufostriga* Pack.

Oligia festivoides Gn.

Hillia iris Zett (*orasis* H. S.) A single specimen was of the red-brown var. *vigilans* Grt., and the rest of the ochreous grey form known as *senescens* Grt.

Hillia algens Grt. A series stood correctly, and another series stood elsewhere as *Cleoceris curvifascia* Sm.

Hillia dircinigra Walk.

Protagrotis (*Luperina*) *niveivenosa* Grt. This species, which has occasionally, but by no means always, a spine on hind tibia, is identical with *viralis* Grt. The fact was not known to Sir George Hampson when he published a *viralis*.

Luperina flavistriga Sn. One female, Aug. 1st, 1911.

Luperina stipata Morr.

Luperina passer Gn. There was also a male, dated July 25th, 1911, of a pale grounded, black shaded form of which I have seen specimens from all the way from Montreal to Vancouver Island. I have tried to prove this a distinct species, but so far unsuccessfully. The genitalia in no wise differ from those of normal *passer*.

Hadena indocilis Walk. and vars. *runata* Smith and *enigra* Smith. *Indocilis* is the form standing in our lists as *remissa* Hbn. After much attention to the subject, I have decided that *runata* Smith and *enigra* Smith are in all probability variations of the same species. *Ferens* Smith is an exact synonym of *runata*, and *enigra* is exactly like some of my British specimens of *gemina* Hbn., of which *remissa* Hbn. is a European var. corresponding to our *indocilis*. *Separans* Grt. and *lona* Strk. are probably the same species as *indocilis*, in which case *lona* refers to a form similar to *enigra*. The male genitalia of all the above-named forms, so far as I have yet examined them, both British and North American, are alike. This is about the most variable of our Hadenas. The Heath collection contained a single female only of the var. *enigra*, lacking abdomen, but otherwise in splendid condition, and dated June 26th, 1905. It stood in the series with *miniota*, to which it bears a very close resemblance.

Hadena alia Gn. and var. *rorulenta* Sm.

Hadena vultuosa Grt.

Hadena cerivana Sm. There was one very peculiar aberration which I associate here, though it differed widely from anything previously seen.

Hadena lateritia Hfn.

Hadena dubitans Walk. The black form.

Hadena plutonia Grt. About a third of the specimens so standing were this species, one was *dubitans*, and the rest *Helotropha reniformis*.

Hadena devastatrix Brace. A few of this species stood under their correct name, but a number far greater did duty for *versuta* Smith.

Hadena arctica Bdn.

Hadena occidens Grt., mixed in the series with *arctica*.

Hadena miniota Sm. A few specimens, including two female co-types. I have elsewhere expressed my conviction that *miniota* was a bronze-coloured form of *versuta*, but recent examination of the genitalia of a large number of colour forms of Calgary males has disclosed strong evidence of the existence of two species, not always separable on superficial characters. One unfortunate result of this discovery is that the exact identity of *versuta* must at present remain in doubt. It is quite probable that older names properly belong to both species.

Hadena cariosa Gn. Two specimens.

Hadena commoda Walk. (syn. *alberta* Sm.) Only two specimens stood under their correct name, but numerous others were found mixed with other species. Four specimens stood as *cogitata* Sm. as well as one small specimen of *lateritia*, in truth most surprisingly like *commoda*.

Hadena lignicolor Gn.

Hadena inordinata Morr. One specimen, standing as *semilunata* Grt., the distinctness of which is doubtful.

Hadena mactata Sm., including the grey form *allecto* Sm. A female specimen of a probable variation of this species stood, quite wrongly, under *adnixa* Grt.

Hadena modica Gn.

Hadena semicana Walk. (syn. *hausta* Grt.) One specimen, mixed in the series with *exhausta* Sm. Standing as *semicana* was a single badly worn specimen of *Parastichtis discivaria* Walk. Smith always had an entirely wrong conception of *semicana*, and used to give this name to pale specimens of *fractilinea*, from which it is widely distinct.

Hadena exhausta Sm. A series of very poor specimens.

APHIDIDÆ FOUND ON THE APPLE IN BRITAIN AND THE DESCRIPTION OF A NEW SPECIES FROM AFRICA.

BY FRED V. THEOBALD, M.A.

(Continued from Page 213).

Aphis (Myzus) nigra, nov. nom.

Aphis oxyacanthæ Koch (non Schrank).

Myzus oxyacanthæ Schonteden.

Koch, Die Pflanzen, p. 55, figs. 70, 71, 1857.
Schonteden, Les Aphid. Palæarct., p. 173 (190?).
Theobald, Entomologist, XLIV, p. 404, 1911.

This aphid was found by Koch and described from specimens on *Pyrus pyraster* during May.

It has so far been found in Britain in two localities; once at Mortimer, Berkshire, on apple trees (12, VI, 1911) and at Wye on apples (2 and 20, VI, 1911) and on Hawthorn (6, VII, 1907).

From notes sent me, it appeared to have been abundant on apple trees at Mortimer, with *A. cratægi*, but later at Wye in the same year I found it in several large colonies on apples, living under the leaves of some Worcester Pearmains and a Peasgood Nonsuch, and previously in the same locality on Hawthorn hedges. I have only seen apterous females, but Koch describes and figures the alate viviparous female.

Apterous viviparous female:

Black and shiny; antennæ black, not half the length of the body, of six segments; the 1st wider than the 2nd, scarcely longer; the 3rd nearly as long as the 6th, 4th and 5th about equal, basal area of the 6th nearly half as long as the flagellum; the last two segments and most of the 4th markedly imbricated. The legs may be all black, but now and then the tibiæ seem to be paler on their basal two-thirds.

Alate viviparous female:

Described by Koch as being all black, except the tibiæ, which are yellowish, except at their apices. There are four pairs of lateral

abdominal papillæ before the cornicles. Antennæ black and shorter than the body. Cornicles rather short, black. Cauda black, prominent.

Aphis rumicis, Linnæus.

Aphis papaveris Fabricius.
Aphis thlaspeos Schrank.
Aphis favæ Scopoli.
Aphis atriplicis Fabricius.
Aphis aparines Schrank.
Aphis armata Hausmann.
Aphis dahliæ Mosley.
Aphis hortensis Fabricius.
Aphis atriplicis Buckton.
Aphis euonymi Fabricius.
Aphis ulicis Fabricius.
Rumicifex Amyot.
Meconaphis Amyot.

Linnæus, Syst. Nat., II, 734, 5 and 736, 16.*
Theobald, Rept. Eco. Zool., 1913, p. 27, 1914.

This very abundant black aphis, which occurs on such a great variety of plants, especially Docks (*Rumex spp.*), Beans (*Fabria* spp), Poppies (*Papaver spp.*) and *Euonymus spp.*, was found by myself breeding in small colonies on apple trees at Wye in July, 1913, and again at Borough Green in Kent. In the same year I also found numbers on an apple tree near Herne Bay in Kent. In July, 1913, it was also sent me from the Cyder and Fruit Research Station at Long Ashton, near Bristol, from apple trees. In Kent only apterous viviparous females and their larvæ were found, but from Long Ashton alatæ, as well as apteræ and larvæ were sent. Specimens from apple trees near Exeter, Devonshire, were also received during the same year.

The so-called "Black Dolphin" or "Collier" appears, however, to be only a casual visitor, and has never been reported as causing any material damage. The apteræ can at once be told from the black *Aphis (M.) nigra* by being mealy, and from the dark mealy *Aphis cratægi* by being globose and not flattened.

*For other references vide my paper in Journ. Bd. Agr. (England and Wales) 1912, pp. 467-476.

Moreover, the two last never have white flecks upon them, so often noticed in *Aphis rumicis*, especially in the nymphæ.

In the alate female stage it can at once be told from *Aphis cratægi* by the absence of the basal pale abdominal band and general absence of farinose matter. As I have not seen any alatæ of *A. nigra*, I cannot compare them, but the resemblance to *rumicis* is great.

Siphocoryne avenæ, Fabricius.

Aphis avenæ Fabricius.
Aphis avenæ-sativæ Schrank.
Aphis annuæ Oestlund.
Aphis mali Fitch (non Fabricius).
Aphis cratægifoliæ Fitch.
Aphis fitchii Sanderson.

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Fitch, 1st Rept. Nox. & Ben. Ins., St. N. Y., pp. 49-60, 1856.
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Walsh, Phil. Ent. Soc., p. 301 (=*mali*), 1862.
Walsh, Proc. Ent. II, p. 37 (=*mali*), 1867.
Riley, Am. Ent. I, p. 99 (=*mali*), 1869; and II, p. 178 (=*mali*), 1870.
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Saunders, Canad. Ent. XV, pp. 96-97 (=*mali*), 1883.
Osborn, Bull. Iowa Agri. Coll., 2, 91 (=*mali*), 1884.
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Osborn & Sirrine, Proc. Iowa Acad. Sci. I, pt. III, p. 99 (=*cratægifoliæ*), 1893.
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Theobald, Rept. Eco. Zool. 1905, pp. 30-32, figs. 10, 11, 14, 15 (=*fitchii*), 1906.
Gillette, Journ. Eco. Ent. I, p. 308, 1908.
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Theobald, Insect Pests of Fruit (=*fitchii*), p. 137, figs. 111-114, 1908.
Tullgren, Upp. Prak. Ent. XXII, p. 56, 1913.
Patch, Bull. 233, Maine Agri. Exp. Sta., p. 266, 1914.
Davis, Bull. 112, U. S. Dep. Agri., 1914 (Oat Aphis).

Aphis prunifoliæ Fitch is given by Schonteden as a synonym of this species. As far as I can see, Fitch's species is only *Aphis pruni*.

Prunifoliæ is described by Fitch in his First and Second Report on Noxious and Beneficial Insects of the State of New York, p. 122, 1856.

DESCRIPTION:

Alate viviparous female (spring migrant):

Head, pronotum and thoracic lobes almost black to olive brown, the two last often very shiny; pronotum green in front and behind. Abdomen green, with black lateral spots, 3 to 4 large ones outside and 5 small ones mediad; a dark patch in many at base of the cornicles,* one on the inside and two dark bars caudad of the cornicles, the first broad, the second narrow. Anal plate black. Cauda brown or greenish brown in the middle, dark at the edges. The antennæ are shorter than the body, black; the two basal segments nearly equal in length, the second barrel-shaped and narrower than the first; 3rd nearly as long as the 6th,

*Sanderson describes his *fitchii* as having a yellow spot at the base of the cornicles. This I have never seen in any European specimen.

about twice as long as the 4th, with 17-20 sensoria over its whole length, but not so markedly tuberculate as in *kochii* and *cratægi*, but with many more sensoria than in *pomi;* 4th segment with 10-14 sensoria, the same length as the 5th; the 5th with 0-6 sensoria, including the usual sub-apical one; the 6th about as long as the 4th and 5th; the last three imbricated. Cornicles rather short, either brown or pale greenish brown, somewhat swollen in the middle or irregularly cylindrical constricted at the apex, which is more or less flared and, to some extent, constricted at the base; in some specimens the cornicles are almost black. Legs dark, except base of femora and most of the tibiæ, which are pale greenish brown to pale green or yellowish. Base of wings green to yellow.

Length 1.5 to 2 mm.; *wing expanse* 6 to 7 mm.

Return alate migrant:

Very similar to the former, but appears to be smaller in most cases, and the 5th antennal segment has seldom more than the usual sub-apical sensorium, but in an occasional specimen 1-2 extra ones may occur. The abdomen more variable, green, yellowish or pale brown.

Variation in sensoria of alate female.

The apple spring migrant may often have no sensoria on segment 5, except the usual sub-apical one, but now and then from 1-3 may occur. This also seems to be the case with "*fitchii*" in America. Those from oats and wheat, the return migrants to the apple and pear, usually have none but the sub-apical one, but now and then 1-3 may also occur. In America it seems that this segment usually has a few sensoria. Pergande figures the second generation—the migratory female—with sensoria on segment 5 and states that segment 3 is always strongly tuberculate, frequently also 4 and sometimes also more or less 5 (Bull. 44, D. E., U. S. Dept. Agri.).

Apterous viviparous female:

Green to yellowish green with often more or less distinct mottled areas or dark green median and lateral lines; oval. Eyes black. Antennæ green, dusky at the tips. Cornicles greenish

brown to brown,* slightly swollen in the middle, flared at the tips, where they are slightly constricted, and also to some extent constricted at the base. Legs pale green; tarsi dusky. Cauda small, pale brownish. Antennæ vary from 5 to 6 segments; when of 5 segments, the third is as long as the fifth; 4th longer than the basal area of the 5th; basal area of latter about $\frac{1}{3}$ the length of the flagellum; when of 6 segments, the 3rd is about as long as the 6th; 4th and 5th about equal in length; the apical segments, where they are darkened, are markedly imbricated. In some specimens there is a marked dorsal median deep green stripe, made up of various shaped patches on each segment, sometimes broadly elongated. A few patches of white powder between the dorsal and lateral darker green stripes on the anterior abdominal segments may occur.

Length 2 mm.

The *larvæ* are yellowish green, with two dark spots on the head; legs brownish to greenish white; cornicles deep brown or all green.

Pupæ light yellowish green.

Oviparous female:

Apterous. Somewhat oval. Yellowish green, yellow to almost green or dull green; head often slightly brownish; also the pronotum, antennæ and legs. Antennæ short, of 5 segments, about or less than half the length of the body; 1st segment wider and longer than 2nd; 3rd not quite as long as 5th; paler at the base; 4th short, only a little longer than base of 5th, with a single marked sensorium; 5th with swollen basal area, about quarter length of flagellum.** Eyes dark, prominent. Proboscis reaches to base of second legs, acuminate, apical segment longer than the penultimate. Hind tibiæ slightly broadened, with 29-32 sensoria, not quite reaching the apex. Cornicles short, brown to black, in some almost green, flared at the tip and constricted at base and apex; markedly imbricated. Cauda moderate, spinose, with three pairs of lateral hairs; blunt at apex and dusky to brown.† Anal plate

*Sanderson says that in America it has a "rusty yellow spot at the base of the cornicles." I have never seen this in European specimens.

**Sanderson says "antennæ with but 6 segments."

†Sanderson mentions a dull reddish or orange spot at the base. This I have never seen.

dark, broadly expanded, spinose, with a few hairs. A small papilla between the cornicles and cauda. Hind tibiæ with rather long hairs.

Length .8 to 1 mm.

Male.—Alate. Head and thorax black, shiny. Abdomen black and dull green,* and with dusky lateral spots; dark at the apex. Antennæ black, variable in length, not quite as long, to a little longer than the body; 1st segment larger than 2nd; 3rd not quite as long as the 6th; base pale, with 17-20 sensoria over its whole length; 4th about as long as the 5th, thick, with 14-18 sensoria; 5th with 5-12 sensoria; basal area of 6th small. Proboscis dark, reaching the 2nd pair of legs, acuminate, apical segment longer than penultimate. Cornicles black, flared at apex, constricted at base and apex, imbricated. Legs with dark coxæ; fore femora green, except at apex, mid and hind dark brown; tibiæ green, with dark apices; tarsi dark. Cauda black. Anal black; the cauda with two pairs of lateral hairs and spinose; penis yellow. Wings with brown veins and yellowish-green insertions.

Length 1 to 1.5 mm.

Distribution:

Europe generally; America; Africa?

Food Plants:

Pyrus malus, *Pyrus communis*, *Cratægus sp.*, *Avena sativa*, *Avena orientalis* and *Avena fatua; Hordeum hexastichon*** and *Hordeum distichon*, *Tritivum sativum* and various *Gramineæ spp.?* Walker gives *Cydonia vulgaris*, *Sorbus aucuparia*, *Mespilus germanicus* and *Cratægus oxyacanthæ*. Oestlund records it on Wild Crab Apple and Mountain Ash.

Davis, in his recent paper (Bull. 122, U. S. Dept. Agri., 1914), gives the following food plants: Gramineæ—Wheat (*Triticum vulgare* and *T. dicoccum*†); Oat (*Avena sativa*), Wild Oat (*A. fatua*);

*Sanderson says light yellowish brown.

**The usual name for Barley is *Hordeum vulgare*, but the cultivated forms are grouped into three races: 6-rowed Barley (*Hordeum sativum hexastichon);* 4-rowed Barley (*Hordeum sativum vulgare*), and 2-rowed Barley (*Hordeum sativum distichon*). *Avena sativa* is the Common Oat; *Avena fatua*, the Wild Oat; *Avena orientalis*, the Tartarian Oat.

†The latter is recorded by Mordwilk as hosts of *Aphis padi*, Kalt.—*avenæ*, Fabr. This is not the *Aphis padi*, Reaum.

Tall Oat Grass (*Arrhenatherum elatius*); Barley (*Hordeum vulgare*); Two-rowed Barley (*H. distichon*); Wall Barley (*Phleum pratense*); Canada Blue Grass (*Poa compressa*); Kentucky Blue Grass (*Poa pratensis*); Annual Meadow Grass (*Poa annua*); Crab Grass (*Syntherisma sanguinale*); Upright Chess (*Bromus racemosus*); Rescue Grass (*Bromus unioloides*); Cheat (*Bromus secalinus*); Hungarian Brome Grass (*Bromus inermis*); Orchard Grass (*Dactylis glomerata*); Italian Rye Grass (*Lolium multiflorum*); Perennial Rye Grass (*Lolium perenne*); Red Top (*Agrostis alba*); Red Fescue (*Festuca rubra*); Sheep's Fescue (*F. ovina*); Meadow Fescue (*F. pratensis*); Hard Fescue (*F. ovina duriuscula*); Reed Canary Grass (*Phalaris arundinacea*); Melic Grass (*Melica banhini* and *M. penicillaris*); Johnson Grass (*Andropogon halepensis*); Broom Corn (*Andropogon sorghum*, var.); Koeler's Grass (*Koeleria cristata*); Wild Rye (*Elymus geniculatus*); Virginia Wild Rye (*Elymus virginicus*); Nodding Wild Rye (*E. canadensis*); Corn (*Zea mays*); Teosinte (*Euchlæna mexicana*); Typhaceæ: Cat-tail (*Typha latifolia*); Ammiaceæ: Celery (*Apium graveolens*); Compositæ: Tick Seed (*Coreopsis sp.*); Malaceæ: Apple (*Malus malus*); Pear (*Pyrus communis*); Hawthorn (*Cratægus coccinea*, etc.); American Mountain Ash (*Sorbus americana*); Quince (*Cydonia vulgaris*); Wild Crab Apple (*Malus sp.*); Rosaceæ: Ninebark (*Opulaster opulifolius*); Amygdalaceæ: Plum (*Prunus sp.*); Choke Cherry (*Padus virginiana*) and Wild Black Cherry (*Padus padus* and *P. serotina*); Pergande also gives *Cornus sp.*, *Bursa bursa-pastoris*, *Arctium minus*, all probably accidental hosts.

I have never found it on *Padus*, and it certainly is not the *Aphis padi* of Reaumur.

Life-history:

Fabricius originally described this species from specimens found on Oats (*Avena sativa*). Kaltenbach on *Avena fatua* and *sativa* and on *Hordeum hexastichon* and *distichon*. Thomas (Third Rept., p. 53, 1879) refers to *avenæ* as appearing on the fall wheat and oats in America, working upon the leaves and stalks singly, and that when winter appears that they move down to the ground, some at least entering the soil, and feed upon the sap of the roots, and at the same time he found an alate individual on the blade.

As far as I have observed, the winter is passed in Britain entirely in the egg stage on the apple and pear.

The ova hatch in the beginning of April and by about the 20th of that month I have found numbers of apterous viviparous females on the apple leaves. These apteræ continue to increase through May and towards the end of the month alatæ commence to appear. The earliest date I have of winged females is the 21st, from Hailsham in Sussex. At Wye they have usually appeared about the 29th, but in 1914 many occurred as early as the 10th. These alate viviparous females migrate from the apple and pear until the middle of June, by which time all seem to have disappeared. Pergande and others traced this migration to corn and grasses in America—the so-called *Aphis fitchii* of Sanderson—on the apple, becoming the *Aphis avenæ* of Fabricius on corn. In Britain I have found the same. Apteræ occur on oats, and more rarely barley, from late June onwards. In 1911 I found many as late as September the 19th. By October 15th winged forms have been frequently noticed on self-sown and wild oats, and in most years by the 20th of that month all had flown from the corn back to the apple and pear. But this cannot be general, for the return migrants to the apple seem to appear gradually. Winged females have been for many years noticed to appear on the apples over a much greater length of time. It is possible that many come from wild grasses, although repeated search has failed to reveal them on any kind of grass in the south of England. The alate females on the apple produce living young and these become the apterous oviparous females and the alate males. These sexuales I have found in large numbers year after year in October, and many continue to oviposit late into November. The earliest oviparous females I have found were in October 4th in 1911; the latest on November 15th in 1915. Sanderson says that in America few eggs are laid before September 1st, but in these Islands I have never found any laid as early at that.

Miss Patch says "this species migrates from the apple and certain other members of the Rose family to the oat and other grasses for the summer." She also records it on *Cratægus* at Orono, Maine, U. S. A., in June, as alatæ and pupæ, the latter were green with darker green longitudinal median and sub-lateral lines,

between which ran a row of whitish spots and no rusty or orange-coloured markings near the cornicles.

Davis in his recent paper (Bull. 112, U. S. Dept. Agri., 1914) points out that in America *avenæ* also passes the winter as viviparous females at the lower parts and roots of wheat and other grasses. In the latitude of La Fayette, Indiana, it winters either as viviparous females on grain and grasses or in the egg stage on apple and pear. Further north, he says, this species is probably unable to winter in any but the egg stage, whilst in the southern parts of the United States they may live over winter as viviparous females only, no egg stage appearing. He thus concludes that the apple is not a necessary alternate host. In a recent letter to me this authority thinks that my *Siphocoryne splendens* from Egypt* may be the same as *avenæ*, but it differs markedly in structure, and I have never seen *avenæ* crimson and green in Britain, but Professor Davis says it may be so in America.

DESCRIPTIONS OF AND OBSERVATIONS ON SOME CHALCIDOID HYMENOPTERA.

BY A. A. GIRAULT, GLENNDALE, MD.

Eupelmus marylandicus, n. sp.

Female—Length 1.95 mm., excluding the ovipositor valves, which are straight, compressed somewhat and extruded for a length equal to somewhat over half that of the abdomen. Slender, graceful. Allied to the Australian *pachyscapha*.

Dark metallic purple, the tarsi except the last joint, tips of tibiæ narrowly and the distal half (or a little more) of the middle tibia, white or nearly. Fore wings brown from the proximal end of the bend of the submarginal vein distad to apex, the infuscation broken by two distinct, straight, longitudinal, hyaline stripes, the cephalic and shorter from the base of the stigmal vein to apex and including the cephalic wing margin; the other much longer, extending from a point caudad of middle, nearly opposite the middle of the marginal vein to the apex. Stigmal vein slender, nearly two-thirds the length of the postmarginal. Antennæ inserted about

*Bull. Ent. Res.

in the middle of the face, but below the ventral ends of the eyes, the latter shorter than the cheeks. Scape greatly, rectangularly dilated (over twice longer than wide, excluding the bulla); pedicel somewhat longer than wide at apex, subequal to funicle 5; funicle 1, or the "ring-joint," a little wider than long; 2 over twice longer than wide, 3 and 4 subequal, longest, a little longer than 2; 8 a little longer than wide, subequal to club 1. Mandibles tridentate. Wings rather slender. Cephalic raised piece of scutum and the lateral ridge weak, yet distinct. Axillæ small, convex barely separated, or not at all; scutellum globular, convex. Pronotum quadrate. Abdomen a third longer than the thorax. Sculpture weak. Cephalic femur compressed. Middle tarsi with black teeth beneath.

Described from one female captured by sweeping in the forest, Chevy Chase Lake, Maryland, April 24, 1915.

Type—Catalogue No. 20094, U. S. N. M., the above female on a tag, the head and a fore wing on a slide.

Eupelmus speciosus, n. sp.

Female—Length 2.00 mm., the ovipositor valves shortly extruded.

Light orange yellow, the wings hyaline or sometimes slightly infuscated under the marginal vein, the head dark metallic green (except the mouth) as is also the distal third of the scutellum; legs, ovipositor valves and scape pale yellow. Pedicel suffused with yellow; rest of antenna black. Scape a little compressed; pedicel twice longer than wide at apex, longer than any of the funicle joints, of which 4 is longest, nearly twice longer than wide; 1 wider than long, 2 a fourth longer than wide, 3 next longest, 8 somewhat wider than long. Postmarginal vein but very slightly longer than the stigmal. Head, axillæ and scutellum densely scaly, rest of thorax delicately so. Lateral ridges of scutum joined across near caudal margin, the raised triangular piece reaching to about the middle. Ovipositor valves black at extreme base. Abdomen narrowing gradually to apex, as long as the rest of the body combined. Middle tarsi with black teeth beneath.

Described from seven females in the collection of the U. S. National Museum, on tags bearing the following label: "4841[011], April 3, 1890." Locality, Washington, D. C.?

Types—Catalogue No. 20091, U. S. N. M., the above specimens, a pair of antennæ on a slide.

Eupelmus cyaniceps Ashmead **utahensis,** new variety.

Female—Length 2.00 mm., excluding the ovipositor, which is two-thirds the length of the abdomen.

Differs from the description of *rosæ* Ashmead in having the cephalic femur metallic. Differs from *cleri* in having the postmarginal vein no longer than the stigmal and the ovipositor valves broadly dusky at tips; runs to *cyaniceps* Ashmead, but differs in being much less robust, in having the cephalic tibiæ nearly wholly metallic. *Caudal legs metallic* (except tarsi); middle tibiæ yellow, also the femur except proximad more or less. Funicle 1 much wider than long, 2 and 3 subequal, longest, each about twice longer than wide.

Described from two females in the collection of the U.S. N. M., from American Fork, Utah, July.

Types—Catalogue *No. 20092*, U. S. N. M., the above specimens on tags, a head and fore wing on a slide.

Compared with types of *cleri* and *cyaniceps*. Middle white portion of ovipositor much longer than the basal blue portion, shorter than the distal dusky portion.

Eupelmus cyaniceps Ashmead **amicus,** new variety.

Female—Like the typical form, but the ovipositor valves more slender and the white middle portion shorter than either basal or distal portion (in the typical form the yellowish middle portion is longest.)

Described from three pairs on tags in the U. S. N. M., labelled: "From *Bruchus amicus* Horn, Las Cruces, New Mexico."

Types—Catalogue *No. 20093*, U. S. N. M., the above specimens (three tags).

Eupelmus charitopoides, new species.

Female—Length 1.85 mm., excluding the ovipositor, which is extruded for a length equal to that of the abdomen.

Dark metallic green, the wings subhyaline; tarsi, knees, tips of cephalic tibia, distal half of caudal tibiæ and middle tibiæ except

a cinctus just below the knee, reddish brown; teeth of middle tarsus ventrad white, dense, soft. Venation yellow. Postmarginal vein nearly twice the length of the stigmal ,which is moderately long. Head and thorax very delicately scaly. Axillæ barely separated inwardly. Lateral ridges of scutum distinct, the raised cephalic, mesal portion small. Antennæ inserted below the middle of the face, slightly below the ventral ends of the eyes; scape distinctly much compressed; pedicel twice longer than wide at apex, subequal to funicle 5; funicle 1 slightly longer than wide, 2 and 4 longest, each about thrice longer than wide, 8 thickest, about a half longer than wide. Differs from *Charitopus schwarzii* Ashmead in being shorter, the stigmal vein is twice longer, the legs differently coloured and so on.

Described from one female in the U. S. N. M. from Harper's Ferry, West Virginia, May 19.

Type—Catalogue *No. 20094*, U. S. N. M., the above specimens on a tag, an antenna on a slide.

Scutellista cyanea, Motschoulsky.

Several pairs reared from *Ceroplastes galeatus* Newstead, Kampala, Uganda, Africa, September 6, 1915 (C. C. Gowdey).

Eurytoma galeati, new species.

Female—Length 1.95 mm. Abdomen as long as the rest of the body.

Agrees with the description of *transvaalensis* Cameron, except as follows: The scape is entirely reddish, the middle and caudal tibiæ each bear a distinct, middle black cinctus; the marginal vein is distinctly somewhat longer than the postmarginal. On the depressed basin of the propodeum, which is reticulated, there is a nearly half complete median channel composed of two foveæ end to end on each side of a very narrow median carina. Club 2-jointed; funicles 4 and 5 each somewhat longer than wide, longer than the pedicel. Abdominal petiole a little wider than long. Segment 5 of abdomen longest, equal to 3 and 4 united, abdomen dorsad glabrous, finely scaly distad of segment 5 and on the lateral aspect. Mesopleurum finely punctate, caudal half finely striate cepholo-caudad. Prepectus mostly glabrous. Punctures dense,

distinct. Distal segment of abdomen long-pointed. Stigmal vein slightly shorter than the postmarginal. Funicle 1 somewhat over half the length of the body of the scape.

Described from two females reared from *Ceroplastes galeatus* Newstead, Kampala, Uganda, Africa (C. C. Gowdey), September, 1915.

Types—Catalogue *No. 20095*, U. S. N. M., the above specimens on tags, plus a slide bearing antennæ, a fore wing, caudal legs, a fore leg and a middle tibia.

Aphelinus automatus Girault.

A female, Vienna, Virginia, from *Aphis setariæ* (W. F. Turner).

Coelopisthia confusa, new species.

Female—The same in stature, and so forth, as *fumosipennis* Gahan, but differing as follows: The legs (excluding the concolorous coxæ) are darker, being reddish; the antennæ are inserted a little higher up on the face and differ notably in that the ring-joints are normal (that is not large, the second not subquadrate), the scape is red, the pedicel nearly all dusky black, funicle 1 a little wider than long, 4-6 subequal, much wider than long; the infuscation of the fore wing is fainter and more diffused, yet distinct. At least one mandible 4-dentate (other not seen). Flagellum black.

Described from one female in the collections of the U. S. N. M., labelled "*Semiotellus chalcidiphagus* Walsh., Washington, D. C." This species, superficially, is very similar to *Homoporus crassinervis* Thomson.

Type—Catalogue *No. 20096*, U. S. N. M., the above female on a tag, a pair of wings, a caudal tibia and the antennæ on a slide.

A NEW GENUS OF PTEROMALID CHALCIDOID HYMENOPTERA FROM NORTH AMERICA.

BY A. A. GIRAULT, GLENNDALE, MD.

Tomocerodes, new genus.

Female.—Belongs to the Eunotinæ. Like *Tomocera* Howard, except that the caudal tibia is armed with a very long, stout spur,

as in *Ophelosia*. Antennæ 8-jointed (excluding a very minute ring-joint). Segment 2 of the abdomen occupying the entire surface. Scutellum without a delicate cross-suture near apex. Male antennæ 7-jointed, the funicle joints as in male *Eurytoma*, the club as long as the scape and solid; a very minute ring-joint, but not counted. Abdomen with a scanty tuft of hairs at base on each side. A short postmarginal vein, as in *Tomocera*. Mandibles tridentate, not especially large.

Tomocerodes americana, new species.

Female.—Of the habitus and stature of *Tomocera* genotype. Dark reddish brown, the fore wing infuscated as in the named species, except that the infuscation is rectangular rather than ovate, its ends subtruncate, its proximal end not past the base of the marginal vein (but conical at caudal wing margin and somewhat proximad of the marginal vein) and distad it extends somewhat closer to the apex. Dorsal abdomen (except the sides at base), propodeum (except laterad of the lateral carina except at caudal margin) and all the dorsal thorax laterad of the axillæ and scutellum, metallic purplish; also venter of abdomen more or less (especially distad). Club black, the funicle and tibiæ washed distinctly with purple. Stigmal vein longer than the shortened marginal. Marginal fringe of fore wing somewhat longer than usual (that is, not extremely short). Pedicel much longer than any of the funicle joints, the latter moniliform, 1-2 subequal, smallest, 5 largest, over twice the size of 1. Club not quite as long as the funicle. Abdomen glabrous. Head and thorax very delicately scaly. Propodeum a little longer at the meson, with median and lateral carinæ, the latter closer to the meson than to the minute spiracle; between these carinæ, a cross-carina near the cephalic margin (longer) and one near apex, both curved a little; also a looped carina from base of the lateral carina over to near the spiracle. Dorsal thorax with isolated black bristles. Axillæ not advanced. Scutum nearly as long as the scutellum.

Male.—A third smaller and entirely metallic purple, the wings hyaline, the tarsi brown. The scape is still long, but much shorter than in the female, the pedicel globular; funicles 1 and 2 close

together, 1 ovate (the axis oblique), the others triangular, the base of each triangle about half the length of the club; each funicle joint with a tuft of long silky hair from the apex of their lateral prolongation. Mandibles tridentate.

Described from one pair in the U. S. N. M., labelled "Oaxaca, Mexico, Koebele."

Types.—Catalogue *No. 20192*, U. S. N. M., the above specimens plus a slide bearing the heads and caudal tibiæ and a female fore wing.

JOHN BICKERTON WILLIAMS, F. Z. S.

We regret to record the death, on Sunday, May 28, 1916, of Mr. John Bickerton Williams, one of the oldest members of our Society. Mr. Williams had been in Toronto only about three weeks since his return from Bermuda, where he had spent the winter and where his health, which had been failing for the past few years, had apparently much improved

Mr. Williams was born in Liverpool, England, in 1848, and was educated as an architect, practising a few years in Birmingham before coming out to Canada in 1881. Since then he resided chiefly in Toronto, though he spent a few years in Montreal in the early nineties. He was a Fellow of the Zoological Society and was interested in various branches of zoology, but more especially in ornithology, of which he had a wide and accurate knowledge. Since 1906, when he was appointed Cataloguer of the Biological Museum of the University of Toronto, he did a great deal of useful work in identifying, arranging and labeling the museum specimens, particularly the birds. In entomology he also accomplished much useful work for the museum, his interest centering in the butterflies; and he contributed several articles to the Canadian Entomologist and the Annual Reports of our Society. He was for many years a most valued member of the Toronto Branch of the Society, acting for long periods as Secretary-Treasurer and as Librarian-Curator. He was also Honorary Curator of the Royal Canadian Institute.

Mr. Williams was unmarried, his only relative in Canada being a brother, Mr. A. R. Williams, of Toronto.

GEOMETRID NOTES.

New Species and Aberrations.

BY L. W. SWETT, WEST SOMERVILLE, MASS.

Hydriomena californiata Pack. ab. **niveifascia** nov.

Expanse 30-35 mm.

Wings pale gray, the red and smoky bands being replaced by silvery white bands. The markings are as in normal *californiata*, except that the watery line of the mesial band of the fore wings is replaced with white. Where the basal and extra-discal reddish shadings usually occur is also white. The marginal, smoky band is replaced with white and the margin of the wings pale gray. The hind wings are smoky brown, with two curved bands, as in the normal form. The extradiscal dots on the fore wings are minute and black. Beneath them is a trace of the white lines above, showing through on the fore wings; otherwise, as in normal *californiata*.

This is a most striking form, and would require some time and study to place it correctly, if it were not for the date of capture and the character of the palpi. I do not believe in describing aberrations of the species of Hydriomena where they are slight, but this albinic, banded form seems very unusual, and I recall no previous case of this variation in North America form.

Holotype—♂, Goldstream, B. C., April 19, 1908, from Mr. E. H. Blackmore, in my collection.

Allotype—♀, Victoria, B. C., June 6, 1908, returned to Mr. E. H. Blackmore.

Nomenia obsoleta, n. sp.

Expanse 20-23 mm.

Fore wings white, with a very slight fuscous tinge, the costa with nine or ten irregular brown lines, which, if produced, would cross the wings. The first line curves outwardly to the median vein, then stops and appears as a spot on the inner margin. The other lines, continued to the intradiscal, show only as minute brown dots on the median vein and inner margin. The intradiscal line is very irregular and shows only very faintly, appearing as heavy dots on the median vein and inner margin. The discal dot is small and black, with the median space pure glistening white. The extra-

discal double line is the most prominent marking on the wings. It starts as a geminate line at the costa, just beneath which it is outwardly sharply angled. It curves backward from costa toward discal spot, opposite which it is again outwardly angled; then runs a straight course for a short distance and, making a curve inwardly runs straight to inner margin. At the costa there is a large brown spot joining these geminate extradiscal lines, another at the median vein and a smaller one on the inner margin. Beyond, the marginal lines run almost straight across the wings with no inward curve as in *duodecemlineata* Pack., the only angle being at the costa. Fringe pure white, with black dashes at ends of veins. The wings are not gray as in *12-lineata* Pack., but glistening white with brown spots, and the extradiscal is the only line crossing the wing except the two marginal pale lines. Hind wings pure glistening white, with trace of extradiscal line running straight across the wing. It appears as a dot on the inner margin, then on each vein to the cell, where it is elongated and heavy; then in small dots on veins to the outer margin. There is an apparent marginal line, but the dots are so small and faint that it is difficult to see. I can see no discal spot except perhaps a slight darkening of the scales.

Beneath: Fore wings darker than above, with fuscous tinge, extradiscal and marginal lines showing through. Discal spots black and prominent on all the wings. Hind wings white, as above, extradiscal line running straight across the wing, appearing as dots on the veins, no curve visible. Beyond this there are traces of two marginal faint dotted lines. On the abdomen above at base are two twin dots which sometimes join, forming a black band. Geminate spots are also present on each segment almost to the tip. This species differs from *duodecemlineata* Pack. in its larger size, pure white colour and brown spots and course of lines.

Holotype—♂, Goldstream, B. C., April 19, 1908, from Harvey collection.

Paratype—♂, Victoria, B. C., April 19, 1908, in Provincial Museum Collection.

Allotype—♀, Goldstream, B. C., April 19, 1908, from Harvey collection.

Paratype—♀, Victoria, B. C., April 26, 1908, from Harvey collection.

All these were received through Mr. Blackmore. I am not sure that the ♂ paratype is exactly like the others. It has a fuscous tinge and more nearly approaches the *12-lineata* Pack., but it is best referable here, I think. *Obsoleta* Swett looks a trifle like small *Venusia cambrica* Curtis, if pure white, though the antennæ would show the difference at once.

Diastictis andersoni, n. sp.

Expanse 27 mm.

Fore wings smoky gray or bluish gray, with three prominent costal brown patches. The first is a basal patch, from which a faint line curves outwardly to inner margin. The second line runs almost straight across wing to margin; the third line is most prominent and runs with an outward curve to about two-thirds of the wing, and then runs straight to inner margin. There is a trace of a fourth costal patch, and beyond the extradiscal line is a heavy fuscous shade running from median vein to inner margin. Hind wings are of the same colour as fore wings, and extradiscal band curves outwardly across wing. No discal spots apparent in any of the wings above. Fringe grayish, with a slight darkening near apex of fore wings. Beneath, the fore wings are a smoky gray in colour; the extradiscal line showing through; beyond which they are somewhat striated. Hind wings: Discal dot large, extradiscal line heavy, and all the wings somewhat striated, giving them a mottled appearance. This form looks somewhat like *occiduaria* Pack , if smoky gray, but the extradiscal lines on both wings are more curved, and it lacks any yellow shade.

This form is possibly an aberration of some known species, but I hardly think so, as it was taken by Mr. Anderson at Atlin, B. C., which is pretty far north. I take pleasure in naming this form after Mr. Anderson, who has proved to be an indefatigable collector, and who has done much to further our knowledge of the Geometrids of Northern British Columbia.

Holotype—♂, Atlin, B. C., July 13, 1914, in my collection through the kindness of the collector, Mr. E. M. Anderson.

Paratypes—from same locality and date in Provincial Museum collection at Victoria, B. C., also in that of Mr. E. H. Blackmore.

This form must be allied to *inceptaria* Walk., which is, in my opinion, distinct from *argillacearia* Pack. Dyar's reference is also incorrect. It was described as *Numeria inceptaria* in the Canadian Naturalist and Geologist, Vol. 5, pp. 241-266, Aug. 1860. *Argillacearia* Pack. seems to lack definite lines, while, according to the description, *inceptaria* has two on the hind wings and three on the fore wings. I rather think it is nearer *exagaria* Hulst and *inceptaria* than *argillacearia*.

SOME ROCKY MOUNTAIN ANDRENID BEES.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

Andrena cyanura, sp. n.

♂. Length about 12 mm.; black, with the abdomen shining dark blue; hair of head and thorax abundant, mainly very pale ochreous or white, with an ochreous tint, but black at sides of face, on lower part of clypeus, on front, vertex anteriorly, cheeks, posterior part of mesothorax and pleura except upper part; sides of metathorax with copious entirely pale hair; facial quadrangle much broader than long; process of labrum very broadly rounded; clypeus strongly and closely punctured, with a median raised line; facial foveæ dark chocolate, broad, ending a little below level of top of clypeus; antennæ dark, third joint a little longer than next two together; mesothorax entirely dull, with small punctures; area of metathorax granular, defined by absence of hair; tegulæ black; wings strongly brownish; stigma rather small, ferruginous, with a dark fuscous margin; nervures fuscous; second s. m. very broad, receiving first r. n. at or near middle; legs with black or sooty hair, floccus on hind trochanters white; hind femora with long white hair on upper side; tibial scopa with stiff, nearly straight hair; abdomen without bands, dorsally almost without hair, shining, without distinct punctures; dense hair at apex black; second segment depressed about a third.

Hab.—Troublesome, Colorado, 2 ♂'s at flowers of *Salix*, June 8, 1908 (*S. A. Rohwer*). A remarkable species, superficially like *A. vicina*, but easily known by the blue impunctate abdomen. From *A. lawrencei* V. & C., it is known by the larger size and black thorax. Also at Troublesome, on the same day, Mr. Rohwer took *A. vierecki* Ckll. at flowers of *Amelanchier*.

Andrena hirticincta surda, Ckll.

This was described from Colorado, the precise locality unknown. Mr. S. A. Rohwer took a male at flowers of *Polygonum*, along with a female *A. vierecki* Ckll., at Boulder, Colo., Aug. 24, 1908. The occurrence of *vierecki*, a spring species, on this date is surprising, and seems to indicate a second brood.

Andrena pertarda, Ckll.

A female was taken at Meeker, Colorado, Aug. 7, 1909 (*Terry Duce*).

Andrena apacheorum, Ckll.

This occurs in Colorado; Green Mountain Falls, August (*J. W. Frey*).

Andrena tacitula grossulariæ, V. & C.

Only the male has been described. I took a female at flowers of *Prunus melanocarpa*, Florissant, Colo., June 24. It looks like *A. cyanophila*, but is quite distinct by the less broadly depressed second abdominal segment, the details of area of metathorax, and colour of hair on hind tarsi. It is also near to *A. saliciflоris*, but the metathorax is different. Clypeus very densely and coarsely punctured, with a smooth median line; facial foveæ narrow, separated from eye only by a shining line, extending far below level of antennæ; third antennal joint about as long as the two following together; flagellum largely red beneath, broadly so apically; mesothorax and scutellum strongly and densely punctured, but disc of mesothorax posteriorly shining between the more widely separated punctures; area of metathorax with strong longitudinal rugæ; stigma dark reddish; hair of head and thorax above fox-red; abdomen shining, well punctured, second segment depressed a little more than half; second to fourth segments with yellowish white hair-bands at sides; hair at apex fawn colour; hair on inner side of tarsi light reddish.

Andrena nigritarsis, V. & C.

Mr. S. A. Rohwer took both sexes at flowers of *Opulaster ramaleyi;* at Boulder, May 23; also a female, June 1. The species is close to *A. fragariana* Graen., but larger; it has the venational

and other characters of typical *Micrandrena*. The male has the tegument of the face entirely black, and the long flagellum is obscurely brownish beneath.

Andrena candidiformis, V. & C.

The facial quadrangle is broader than long, not the reverse, as stated in the original description.

Halictus cyaneiceps, sp. n.

♀ (Type).—Length 8-9 mm.; black, with the front and upper part of sides of face more or less distinctly bluish, contrasting with the pure black clypeus and supraclypeal area; pubescence dull white, forming broad bands at bases of abdominal segments; clypeus little produced; antennæ black; mesothorax shining and sparsely punctured on disc posteriorly; scutellum shining, with punctures of different sizes; area of metathorax dull, finely roughened, basally obscurely sublineolate, at apical middle there is a depression; posterior truncation not distinctly defined; tegulæ piceous; wings greyish hyaline, stigma and nervures dusky amber colour; punctures of abdomen excessively minute; hind spur with short blunt teeth.

♂.—Length hardly 8 mm.; face broad; clypeus shining, with a broad creamy-white band; flagellum long, marked with ferruginous beneath; area of metathorax shining apically; tarsi dark brown.

Hab.—Rio Ruidoso, New Mexico (C. H. T. Townsend); the type taken at flowers of *Heliopsis scabra*, July 31, alt. prox. 6500 ft.; also found (both sexes) on flowers of *Potentilla thurberi*, July 31, and on July 20, at 6900 ft., at flowers of *Verbascum thapsus*. South Fork Eagle Creek, New Mexico, at flowers of *Sicyos parviflorus*, Aug. 18, at 8000 ft., and Aug. 19, at 8250 ft. (C. H. T. Townsend). I have had *H. cyaneiceps* a number of years, and have referred it with hesitation to *H. bardus* Cresson and to *H. forbesii* Rob. It is very closely related to *forbesii*, but distinguished by the bluish front of the female and dark tarsi of the male. I have not described the structure in detail, where it agreed with *H. forbesii*. The male is very like that of *H. trizonatus* Cress, but is readily distinguished by the broad, short head. Male *trizonatus* was taken on *Potentilla thurberi* at the same time and place as *cyaneiceps*.

NOTES AND QUERIES.

A Japanese Bug New to New Jersey (Hemip.).

During the latter part of the summer of 1915 an outbreak of "lace bugs" occurred on hardy azaleas growing in widely separated parts of New Jersey, notably at Rutherford, Riverton, Arlington, Palmyra and Far Hills. At some of these places the damage was quite severe, much of the foliage being lost and the remainder discoloured and brown. Through the courtesy of Dr. L. O. Howard, the species was identified by Mr. Otto Heidemann as *Stephanitis azaleæ* Horv., of the family Tingitidæ. Mr. Heidemann also said that this insect was first observed in the United States by Dr. Chittenden several years ago at Washington, D. C., on azalea plants from Holland, the bugs being imported there from Japan. Most of the infested azaleas in New Jersey came originally direct from Japan. For the past several years *Azalea amœna* var. *Hinodegiri* has been a favorite with New Jersey importers, and this was the variety against which most of the bugs directed their attacks. The species was described in 1912 by Dr. G. Horvath in the X Annales Musei Nationalis Hungarisi, p. 333, Budapest, Austria.

Harry B. Weiss, New Brunswick, N. J.

A State's Insects and Their Activities.

BY HARRY B. WEISS, NEW BRUNSWICK, N. J.

According to Smith's Insects of New Jersey, and other papers dealing with the insect fauna of that State, the number of species listed from New Jersey is about 10,530. Considering them collectively, and in a general way, it is interesting to know what they are doing. Are most of them injurious to vegetation? Are many beneficial? and so on, are the questions which naturally arise when so many species are considered. Such inquiries can best be answered by charting the actual proportions of each group engaged in different lines of work. This has been done on the accompanying chart. The large circle indicates what proportion of the total number of all species found in New Jersey is occupied by each of the important orders. The smaller circles indicate the predominating activities of each of the main groups, these activities being separated as: insects injurious to vertebrates, those feeding upon or injurious to vegetation, predatory species, scavengers and parasites. It would be possible, of course, to have a larger number of divisions, but many

would complicate matters considerably and make the chart difficult to follow. As it stands, one can obtain a general idea as to what

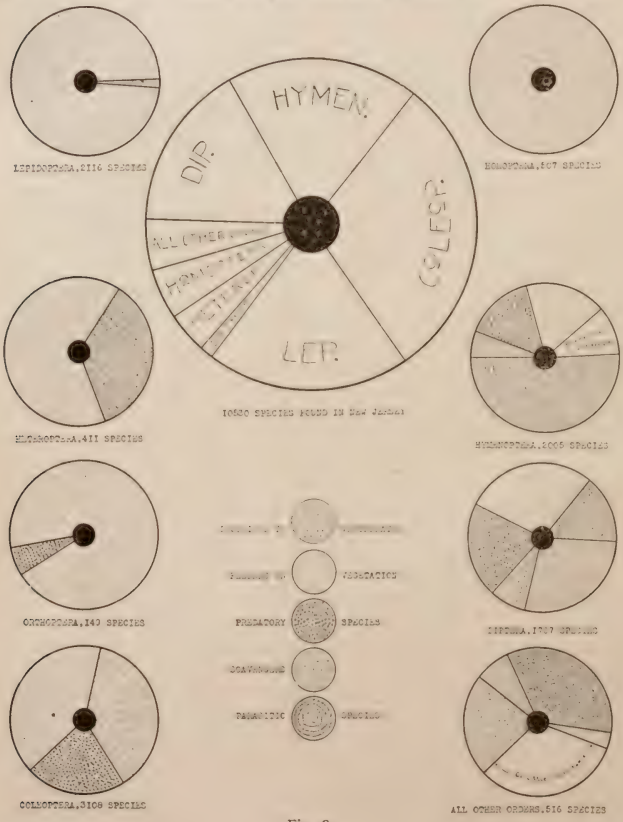

Fig. 9.

the insects belonging to each order are doing. It is a noteworthy fact that almost one half of the species of insects, which we have in our midst, are engaged in useful activities.

Mailed July 12th, 1916.

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POPULAR AND PRACTICAL ENTOMOLOGY.

A Few Days in Newfoundland.

BY E. M. WALKER, TORONTO.

(Continued from page 221.)

On my fourth day at Spruce Brook I crossed the lake in a skiff, and, following the directions of Mr. Whittington, started on the trail to Beaver Pond, a small lake surrounded by dense woods, which I reached after a few minutes' walk. Here I was equipped with a canoe, kept by the proprietors of the Log Cabin Hotel for the use of fishing parties, and I was thus able to explore all parts of the lake with ease. I found but one marshy spot of any considerable size, at the head of the lake, where it was fed by a cold trout stream.

At this spot there were a few damsel-flies and two or three Leucorrhinias flitting over the lily-pads and pond-weeds, but no species was present in even moderately large numbers. Five kinds of damsel-flies were taken here, viz., *Enallagma calverti*, *E. ebrium*, *Cœnagrion resolutum*, *C. interrogatum* and *Ischnura verticalis* Say, the last named species being new to Newfoundland, though a very common insect in Eastern Canada and the United States. Of *C. interrogatum* I took but one more specimen. The others were not uncommon.

Of larger forms our familiar *Libellula quadrimaculata* L., found almost everywhere in Canada, as well as in the Old World, was the only species taken at this spot, the Leucorrhinias having been frightened away, but a pair of exuviæ of *Æshna canadensis*, E. Walk., found upon a tangle of algæ, furnished another record for Newfoundland, although the only adult Æshnas I saw at the lake were two or three large blue forms, which I feel sure were *A. eremita* Scudd.

Just after leaving the marsh, I was attracted by a clear-winged dragonfly, evidently a Corduliine, speeding along a few feet above the water and closely following the shore-line. I took up a position

in the shelter of a bush and waited for a chance to strike with the net from behind. In a few minutes I had netted a male of *Cordulia shurtleffi* Scudd, and soon afterwards I had several more. This is a beautiful insect with a bronze-green body and brilliant green eyes. It is a very characteristic northern species, common across Canada to Vancouver Island. I also took here a fine male of *Somatochlora cingulata* Selys, the first I had ever seen. With its dark bronze body, with white transverse abdominal lines and bright green eyes, it looks very like a large form of *S. albicincta*, but it is much less common. It was the last dragonfly I captured in Newfoundland, as I was now obliged to return to the hotel, and, on the same day, to start on my homeward journey.

I have made several allusions to the scarcity of dragonflies in the vicinity of Spruce Brook. How are we to account for such a scarcity under apparently favourable conditions? Of course, there are good and bad years for dragonflies, as for everything else, but I am inclined to believe that some other cause than the usual seasonal ones was operating here. It is worthy of note that all the lakes and ponds where I collected were connected with trout streams, and it is well known that brook trout feed upon dragon-fly larvæ. Beaver Pond, particularly, teems with trout, and is a favourite place for trout-fishing. I saw numbers of fingerlings at the spot when I collected most of my dragonflies. It is therefore a possibility that the scarcity of dargonflies in this locality was due, in part at least, to the abundance of brook trout.

There appeared to be a similar scarcity of other aquatic insects, very few caddis-flies, e.g., having been observed. The little dark *Mystacides sepulchralis* was rather common about Beaver Pond, but the only other species noted were a few specimens of a Limnephilid, not yet determined, and a single example of the large *Glyphotælius hostilis*, found in a spider's web. Like most of the dragonflies noted, this species ranges widely across the continent in the north.

Diptera and Hymenoptera seemed to be fairly plentiful at Spruce Brook, in individuals if not in species, though little effort was made to collect them. One of the best places to obtain them was a glass-covered passage connecting two parts of the Log

Cabin Hotel. As the doors were kept open, these insects entered in large numbers and collected on the window-panes. The most numerous were the flies, though a large proportion of these were ordinary blue-bottles (*Calliphora erythrocephala*) and allied forms, such as *Lucilia cæsar* and *Cynomyopsis cadaverina*.[1] An undetermined Anthomyid was very common, but no house-flies were seen. Syrphididæ were numerous, the following species having been taken here and elsewhere in the vicinity: *Sericomyia chalcopyga* Lw., *Syrphus ribesii* L., *S. torvus* O. S., *S. geniculatus* Macq., *S. umbellatarum* Sch., *Sphærophoria cylindrica* Say., *Xylota vecors* O. S., *Temnostoma æquale* Lw., *T. alternans* and *Eristalis meigenii* Wied.[2]

Of Hymenoptera wasps were plentiful and included at least three species of Vespa, viz., *V. consobrina*, *borealis* and *diabolica*. Bumblebees were abundant in the bushy clearings and roadways, but nearly all belonged to the characteristic Newfoundland species, *Bombus bolsteri* Franklin, though I took also *B. borealis*. The large leaf-cutter bee, *Megachile vidua* was also occasionally seen, but no attempt was made to collect the smaller bees, nor, in fact, any of the Hymenoptera, the few captures made being quite incidental. These few included two saw-flies, *Macrophya trisyllaba* and *Trichiosoma lanuginosum*, a large Cimbicid, which I have taken as far west as Banff, Alta.; a horntail, *Urocerus flavicornis;* a long-tailed ichneumon-fly, *Rhyssa albomaculata*, both of similar wide distribution, and a smaller member of the same family, *Ichneumon feralis*.

The other orders of insects were also of necessity left unmolested. They seemed to be equally poorly represented, the scarcity of butterflies being particularly noticeable. I had expected to pick up a few interesting northern forms, of such genera as *Oeneis*, *Brenthis* and *Eurymus*, but saw only a few of our commonest Canadian species, such as *Brenthis myrina* and *Euvanessa antiopa*.

Of course, no conclusions can be drawn from such fragmentary observations as these, as to the extent of the insect fauna of Spruce

1. Determinations by C. H. T. Townsend. 2. Determinations by M. C. Van Duzee (except *T. alternans*).

Brook, much less that of Newfoundland, but my general impression was that of a fauna poor in species, not only of insects, but of other animal groups. The evidence for this seemed to be fairly definite as regards the Orthoptera, and it is well-known to be true of some of the vertebrate groups. There are no native reptiles nor Amphibia in Newfoundland, and many of the characteristic Canadian mammals are absent, e.g., the Moose, Wapiti, Brown Bear (*Ursus richardsoni*), the Sciuridæ, or squirrel family, etc. In the small streams I saw only trout and stickleback; no minnows, nor other Cyprinoids, and no crayfish.

The absence of these animals, or some of them, has been explained as a result of the Glacial Period, during which Newfoundland, already separate from the continent of North America, was independently glaciated or partially covered by an ice-sheet of its own. As a result, its fauna has been in large measure exterminated, instead of being pushed farther south, as on the mainland, and the re-establishment of such exterminated species on the return of favourable conditions has been in many cases impossible.

A faunistic study of Newfoundland is a great desideratum, especially of those groups of animals to whose natural means of distribution a short distance over sea acts as a barrier. Such, for example, are flightless insects, or those incapable of sustained flight, e.g., many Orthoptera, most vertebrates except birds, exclusively fresh-water fishes, the larger Crustacea, land and fresh-water Mollusca, etc. It is among these same groups, except the Mollusca, that we have already noted evidence of a paucity of species. As regards the Mollusca, I have practically no data at hand. I found a few land and fresh-water forms, including a single Mussel (*Anodonta* sp.), which was common in Beaver Pond, a few fresh-water snails, such as the common *Planorbis campanulatus*, and a few land forms, of which the large *Succinea ovalis* was very plentiful. I also picked up *Pyramidula cronkhitei anthonyi*, a little striated form common almost everywhere in Canada, *Agriolimax agrestis*, a common garden slug, introduced from Europe, and *Helix hortensis*. This last form, already recorded from Newfoundland by Prof. Cockerell, is a species of very interesting distribution, occuring on the eastern coast of North America

and the adjacent islands, from New England to Labrador, in Greenland, Iceland and Western Europe. It is one of the forms whose distribution supports the theory of former connections between these land-masses.

My trip to Newfoundland, from the dragonfly standpoint, was certainly not a success, yet I left the island very reluctantly, realizing more keenly than ever before, that on a long trip to a strange locality one must be prepared to remain there long enough to find the conditions of environment most favourable to the group one is collecting or studying, and to be reasonably sure of a fair proportion of good weather.

APHIDIDÆ FOUND ON THE APPLE IN BRITAIN AND THE DESCRIPTION OF A NEW SPECIES FROM AFRICA.

BY F. V. THEOBALD, M.A.

(Continued from page 242.)

Phorodon humuli Schrank.

Aphis humuli Schrank.
Aphis mahaleb Koch.
Aphis pruni-mahaleb Fonscolombe.
Humifex Amyot.
Aphis pruni Scopoli?

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Buckton, Mono. Brit. Aph., I, p. 166, pls. XXX and XXXI, figs. 1-4, 1887.
Theobald, Insect and Allied Pests Fruit, pp. 247-252, figs. 181-183, 1908.
Theobald, Rept. Eco. Zool. year 1911, pp. 33-34, 1912.
Scopoli, Ent. Carn., 138, 406, 1763?

This well known hop and prune aphid has been found by me once on apple. It was not only living on the apple foliage, but

was reproducing and developed large colonies at Wye in August and September 1911, which gave rise to an alate brood which migrated during the latter month. It is possible that Scopoli's *Aphis pruni* is this insect.

Aphis pomonella nov. sp.

Alate viviparous female:

Antennæ shorter than body; first segment larger than the second; third a little longer than the fourth, shorter than the sixth, with 5 to 6 round sensoria along its whole length; fourth about the same length as the fifth, the latter with normal sub-apical sensorium; sixth about as long as fourth and fifth, its basal area half as long as the flagellum. All the segments imbricated, the two basal ones dark; base of third and basal half of fourth paler. Head with slight lateral tubercles and slightly raised in the middle. Proboscis reaching to the third coxæ, acuminate. Pronotum with lateral papillæ. Head apparently brownish and green. Eyes

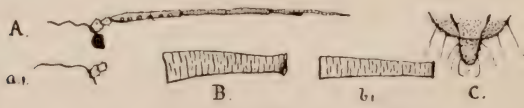

Fig. 9.—*Aphis pomonella* nov. sp. A, Head and antenna of alate viviparous female; a, head of another specimen. B, *A. kochii*; b, hind tibia. C, *Siphocoryne avenae*; c, hind tibia.

dark. Thoracic lobes dark. Abdomen apparently greenish with three large, dark lateral spots before the cornicles. Cornicles moderately long, black, slightly swelling towards the base, markedly imbricated and serrated laterally. Cauda blackish, about half the length of the cornicles, spinose with three pairs of lateral hairs. Anal plate dark, spinose, with two long, apical hairs on each side. A large papilla on each side between the cornicles and cauda, and traces of 3 lateral abdominal ones between the cornicles and thorax. Front legs green with black apices to the tibiæ and black tarsi; hind legs with dark femora, except at the base; coxæ black. Wings normal, veins and stigma yellowish brown to yellowish green.

Length 1.2 to 1.6 mm.

Locality:

Nairobi, British East Africa (T. J. Anderson).

Food Plant: The apple.

Described from a number of alate females preserved in spirit. The colour appears greenish. It somewhat resembles De Geer's *Aphis pomi*, but can at once be separated by (1) the different antennæ and (2) by the shorter cornicles. *Aphis pomi* has a greater number of sensoria on segment 3 of the antennæ, and more irregularly disposed, and also some on segment 4. There were also some nymphæ in which the cornicles are shorter and thicker.

OTHER SPECIES ON APPLE IN AMERICA.*

Four other species are recorded on the apple in America, namely:—

1. *Myzus persicæ* Sulzer (Patch, Bull. 233, Maine Agri. Exp. Sta., p. 267, 1914).

2. *Aphis brevis* Sanderson (Bull. 74, Del. Coll. Agri. Exp. Sta , p. 157, 1906). This has not so far been found in Europe. It also feeds on quince, and Patch (p. 257) records it on *Cratægus*. It migrates in summer to clover, sweet peas, etc. On hawthorn it causes the leaves to become distorted into dark purple curls.

3. *Aphis bakeri* Cowen (Bull. 31, Tech. Se. Colo. Exp. Sta., p. 118, 1895) is also an apple pest in America and migrates to clover (Gillette and Taylor, Bull. 133 Agri. Exp. Sta., Col. Agri. Col., 1908).

4. *Aphis medicaginis* Koch, is recorded by Gillette (Journ. Eco. Ent., I, p. 308, 1908, and Bull 133 Colo. Agri. Coll. Exp. Sta., p. 32, 1908) on tender, new apple shoots.

A NEW GENUS OF LELAPINE CHALCID FLIES FROM THE UNITED STATES.

BY A. A. GIRAULT, GLENNDALE, MD.

The following genus is similar to the Australian Uriolelaps Girault, but there are no perfect wings, and only one ring-joint (though apparently two by transverse central division of the one), the antennæ 12-jointed, the club 2-jointed.

Apterolælaps, new genus.

FEMALE—Name proposed by Ashmead, but never made valid by description of a genotype.

Apterolælaps nigriscutum, new species. Genotype.

FEMALE—Length 3.00 mm.

Reddish yellow, the following parts black: Upper third of occiput except dorsad centrally, vertex, upper half of face (mostly mesad), antenna (except scape, pedicel, ring-joint, funicle 1 and narrowly, extreme apex of club); scutum (except cephalic third), the parapsides and the abdomen except its petiole, dorsolaterad at proximal half of segment 2, segments 3-5 (all short) and the meson of venter narrowly. Head and thorax densely scaly-reticulate, the scutellum long-striate distad of the cross-suture, the propodeum with a median ruga and irregular longitudinal rugæ, the neck distinct. Vertex with about a half-dozen long, black setæ; the scutellum with a similar seta laterad at the cross-suture, the cephalic scutum hairy. Caudal margin of scutum broadly arcuate at the meson. Segment 2 of abdomen glabrous, the rest of the abdomen with short, sparse pubescence. Petiole rugulose. Head wider than the thorax, the antennæ inserted on a level with the ventral ends of the eyes, their scrobes long-triangular, reaching nearly to the cephalic ocellus, cross-striate, divided by a thin carina; an arcuate cross-carina just ventrad of the antennæ. Club 2 a little longest of the flagellum; pedicel a little longer than funicle 1, the latter twice longer than wide, 4 quadrate, 7 somewhat wider than long. Mandibles tridentate.

From one female in the U. S. National Museum, Fort Pendleton, West Virginia, "10.7."

TYPE 1—Catalogue *No. 20306*, U. S. N. M., the female on a tag, the head, pair of wings and caudal tibiæ on a slide.

Fore wings minute, linear, subhyaline, four times longer than wide, the marginal vein with long bristles, half the length of the submarginal and terminating at wing apex; the caudal wings are only somewhat longer than wide.

DESCRIPTIONS OF AND OBSERVATIONS ON SOME CHALCIDOID HYMENOPTERA—II.

BY A. A. GIRAULT, GLENNDALE, MD.

(Continued from page 246.)

The following is a table to the North American Species of *Euplectrus* Westwood, based on a study of the types, except in the case of Provancher's species. The latter are genuine species of the genus (perhaps excepting *mellipes*).

Females.—Legs all yellow. Propodeum with a median carina. The species do not differ much in sculpture.

Abdomen yellow.

Abdomen black above at distal third and along the margins. Scutum with a more or less distinct median carina.....*catocalæ* Howard.

Abdomen entirely yellow except the lateral and proximal margins. Scutum with a median carina. Propodeum glabrous.

Male mouth broadly white.....*comstockii* Howard.

Male face entirely black.....*platypenæ* Howard.

The same but the abdomen with a black area at meson at base of distal third. Mouth in both sexes white. Propodeum glabrous. Median carina on scutum more or less distinct.....*leucotrophis* Howard. (=*frontalis* Howard).

The same but mouth black; propodeum coarsely scaly.....*marginatus* Ashmead.

Abdomen black. Pronotum not rugose.

Black.....*mellipes* Provancher.

Metallic.....*lucens* Provancher.

Abdomen black with a large basal area above.

Submetallic.....*viridæneus* Provancher.

Euplectrus insuetus Gahan (types examined) is not an euplectrine. The caudal tibial spurs are not *very* large; the scutellum bears a true lateral groove (*mesad* of the bristles).

Diaulinus intermedius new species.

Female.—Like *begini* Crawford but the annulus on the caudal tibiæ is *distinctly* broader than the yellow proximad of it (over

twice broader), the postmarginal vein is subequal to the stigmal (distinctly longer in *begini*) and the funicle joints are not subequal. The mandibles are 4- and 5-dentate in both species, and in both the caudal tibial spurs are single. Differs from *pulchripes* in that the said annulus is narrower, not extending to the middle (distad of it in *pulchripes*); also the scape is wholly black (white at basal third in the other species). In *pulchripes*, both mandibles are 5-denate and the caudal tibial spurs *single*. From *websteri* in the colour of the legs; the median carina of the propodeum is distinct, not as in *pulchripes* but very delicate as in *websteri* and *begini*; and in *websteri* the postmarginal vein is longer than the stigmal. In *websteri* the mandibles and scape are as in *pulchripes*, also the caudal tibial spur.

Propodeal spiracles minute and round, the lateral carinæ absent. Funicle 1 longer than wide, 2 subquadrate. Club with a distinct terminal nipple in all four species and this terminates a small conical joint, so that the club is 4-jointed.

Described from one female reared at Kingston, Rhode Island, January 6, 1916, from *Phytomyza chrysanthemi* (A. E. Stone).

Type.—Catalogue *No. 20193*, U. S. N. M., the specimen in fragments on a slide.

Pseudiglyphomyia coptodiscæ new species.

Female.—Length, 1.60 mm. Characterized by bearing on the fore wing an obcuneate brown stain from the stigmal vein and of moderate size (extending nearly across the blade).

Lemon yellow, the following parts dark metallic green; Occiput at upper half, ocellar area, proximal half of pedicel, scape except at extreme base, apex of the neck of prothorax, somewhat over the cephalic third of the scutum (except at lateral margin), the green area with a scalloped caudal margin, the scutellum except lateral margins except at base and the cephalic and caudal margins between the grooves (the cephalic more broadly yellow and irregular), postscutellum except lateral and apical margins, propodeum except laterad of the spiracle, dorsal thorax laterad of the postscutellum and apical scutellum except at lateral margin, base of abdomen narrowly (except at meson more or less), caudal coxæ dorsoproximad broadly, a rather broad stripe around abdomen just

distad of the middle, then a very narrow one (dorsad) and then a slightly broader one near apex, the three more or less fused along the meson, the apical one not as broad as the first one at middle. Middle tibia with a central submetallic cinctus. Propodeum with a median carina only. Thorax scaly. Postmarginal vein not quite so long as the stigmal. Funicle 1 a half longer than wide, 2 somewhat shorter; club terminating in a long conical spine. Pedical as long as funicle 1 or a little longer. Mandibles 5-dentate. Antennæ brownish.

The male is similar but the antennæ are all light yellow (except pedicel and apex of scape broadly, which are darker), the occiput has only a minute dark spot on each side, upper half, the pronotum has a narrow median line at cephalic half from the metallic apex of neck, the scutellum is green between the grooves except very narrowly at apex, the line at base of abdomen is triangular, large, extending nearly to lateral margins while the narrow distal two stripes of the abdomen are absent, the middle stripe with a large rectangular area against it caudad at meson. Also, the terminal spine of the club is small.

From one pair reared from *Coptodisca splendoriferella*, Madisonville, Kentucky, October 16, 1899.

Types.—Catalogue *No. 20194*, U. S. N. M., the pair on tags, the heads and a male fore wing on a slide.

Asaphes americana Girault.

One pair reared from the clover aphis, Lexington, Kentucky, May 28, 1890 (H. Garman). Compared with types.

The marginal vein is somewhat dilated distad. Petiole of abdomen somewhat longer than wide, longitudinally striate. Abdomen glabrous, segment 2 longest, occupying nearly a third of the surface, 3 large yet somewhat shorter than 2, extending to beyond the middle; 4 half the length of 3, with four cross-rows of minute reddish setæ (except along the median line). Propodeum rugoso-punctate and with a short neck; *scutellum with a distinct punctate cross-suture* a little before apex, glabrous distad of it. Parapsidal furrows complete. Axillæ and caudal margin of parapside, glabrous. Pronotum transverse-quadrate, shorter than the scutum.

Trichogrammatomyia new genus.

Female.—In my table to the *Chaetostrichini* runs to *Brachygramma* Girault (there is a ring-joint, the antennæ 7-jointed); but the following differences: The marginal vein is not stout yet not long (about six times longer than wide, nearly twice the length of the well-developed stigmal); the ovipositor is inserted proximad of the middle of the venter by a little; the marginal fringes of the not broad fore wings are long (more or less a third the greatest wing-width), the club is not much wider than the funicle; the discal ciliation of the fore wing is moderate and bears regular lines cephalad and caudad only. Caudal wings narrow, not long, with two lines of discal cilia, the caudal marginal cilia as long as the marginal cilia of the fore wing. Habitus of *Trichogramma*. No oblique line of setæ from the stigmal vein. Caudal femur stouter, the tarsal joints more or less equal, longer than wide. Mandibles with two acute teeth and an inner oblique truncation.

The male antenna has the flagellum filiform, only one funicle joint which is nearly twice longer than wide and the club is divided near the middle, the two joints about as long as the funicle or the pedicel; funicle and club with long, stiff hairs.

Trichogrammatomyia tortricis new species. Genotype.

Female.—Length 0.50 mm.

Black, the fore wings dusky from base to end of the stigmal vein, the venation dusky. Face, vertex, lateral margins and median line of scutum and distal third of scutum (more at the meson), orange yellow. Club twice longer than its greatest width (at middle), a little longer than the scape, 1 hemispherical, 2 conical, not spined at apex, over twice the length of 1. Funicle joints subequal, each over twice wider than long; pedicel twice or more the length of the funicle. Fore wings with about twelve lines of discal cilia where widest, the ciliation extending back to the base of the marginal vein (centrally). Tarsi pale.

Described from one male, and seven females from the eggs of *Tortrix cerasivorana*, Guelph, Ontario, Canada, (C. J. S. Bethune).

Types.—Catalogue *No. 20195*, U. S. N. M., the specimens on two slides.

BEES OF CANADA.—*FAMILY MEGACHILIDÆ.*

BY F. W. L. SLADEN, OTTAWA.

Principal Characters of Family.—Long-tongued bees, wings with only two submarginal cells, female with pollen brush on underside of abdomen, or, in parasitic genera, absent. The two basal joints of labial palpi very elongate, following joints minute, labrum not exposed.

Table of Genera.

(Where the genus contains only one species this is included. Subgenera are not included, as a rule. Whether *Chlorosmia*, *Alcidanea*, *Autochelestoma*, *Andronicus*, and possibly *Monumetha* should be entitled to generic rank, or be regarded merely as subgenera, is a matter of opinion. The super-generic name for this group should be *Chelestoma* Lat.).

1. Skin of abdomen with pale bands or spots, or second recurrent nervure received by submarginal nervure beyond apex of second submarginal cell, Subfamily *Anthidiinæ*.....2.
   No pale bands or spots on abdomen, second recurrent nervure always received by second submarginal cell.....3.
2. Margin of 7th dorsal segment in male toothed, female with pollen brush.....*Anthidium* Fab.2a.
   Margin of 7th dorsal segment in ♂ simple, female without pollen brush.....*Stelis* Pz.

2a. No pulvillus between claws, makes cottony nest, subg. .....*Anthidium* Ckll.
   Pulvillus between claws, makes resin nest (Cockerell), subg. .....*Dianthidium* Ckll.

3. A pulvillus between claws, abdomen strongly convex, Subfamily *Osmiinæ*.....4.
   No pulvillus between claws, abdomen more or less flattened. Subfamily *Megachilinæ*.....17

4. Base of abdomen bordered with a strong transverse ridge, insect coarsely punctured, ♂ with only two ventral segments fully exposed .....*Heriades*, Spin.
   Base of abdomen not bordered with strong ridge.

5. Base of abdomen strongly concave, the definite basin thus formed impunctate ..... *Ashmeadiella*, Ckll.

No definite basin on base of abdomen.....6.

6. Not very elongate, cubital nervure between first transverse cubital nervure and first recurrent nervure usually as long as, never less than one-half as long as, first transverse cubital nervure.....7.

Very elongate, cubital nervure between first transverse cubital nervure and first recurrent nervure half or less than half as long as first transverse cubital nervure, ♂ with small lateral spine-like tooth on segment 6.....8.

7. Head with two large teeth beneath, nearly the whole of clypeus impunctate, two small tubercles on margin of clypeus near centre, mandibles very long .....*Cephalosmia* n.g., 1027, *armaticeps*, Cr. Invermere, B. C., Okanagan Landing, B. C.—IV, V, VI.

Cheeks not armed, clypeus punctured.....*Osmia*, Spin.

8. Males .....9.

Females.....13.

9. Brilliant metallic green, ventral segments 1 and 2 with small median tooth.....*Chlorosmia* n.g., 2050, *fulgida*, Cr. British Columbia.

Black.....10.

10. Terminal antennal joint much narrowed and modified into a curved spine, flagellum widely and shallowly channelled behind, scape dilated ..... *Alcidamea* Cr.

Terminal antennal joint not much narrowed, not modified into a spine .....11.

11. Ventral segment 2 with a large tooth, segment 1 with median impressed line at base, segment 7 pointed, compressed, excavated.....*Autochelostoma*, n.g., 2059, *canadensis*, n.sp. .....Ottawa (?), 14, VIII.

One specimen, Br. Germain, 1914.

Ventral segment 2 without large tooth.....12.

12. Antennæ distorted, joints 4 to 7 wider than long and bearing bristles, joints 10 to 13 longer than wide, ventral segment 1 bluntly pointed..... *Andronicus* Cr., 2053, *cylindricus*, Cr.

Toronto, Ottawa, 6, VI.

Antennæ simple, ventral segments 1 and 2 with median apical spine, coat somewhat long.

Monumetha Cr., 2047, *argentifrons* Cr. (—*albifrons* Kirby). Ontario to British Columbia, Ottawa, 6, VI.

13. Pollen brush black.....14.

Pollen brush white.....15.

14. Brilliant metallic green.....*Chlorosmia*, 2056, *fulgida* Cr. British Columbia.

Skin entirely black, abdomen black-haired, with lateral apical hair patch on segment 1, narrowing on the following segments .....*Monumetha*, 2048, *argentifrons* Cr. (=*borealis* Cr.). Ontario to British Columbia, Ottawa, VI.

15. Mandibles very large, head wider than thorax, upper part of clypeus with longitudinal median impression, lower part with large upstanding tooth, a low longitudinal carina between antennæ, first recurrent and first transverse cubital nervures interstitial, labrum long and sheathlike, much longer than wide, maxillary palpi three-jointed, labial palpi four-jointed, the 3rd and 4th joints not divergent, 4th as wide as long, wider than 3rd, 3rd joint pale, 4th dark; insect scantily clothed with whitish hair, which forms narrow apical fringes on segments 2 to 4, and on sides of segment 1, length 8 to 9 mm .....*Formicapis* n.g., 2055, *clypeata* n.sp.

Aweme, Man., 6, VII.—One specimen, N. Criddle, 1915.

Waterhole, Alta., 18, VIII.—One specimen, E. H. Strickland, 1915.

Head no wider than thorax, clypeus normal.....16.

16. Larger, length 10 to 12 mm., clypeus not more coarsely punctured than vertex, length of cubital nervure between first transverse cubital and first discoidal much longer than half that of the first transverse cubital nervure, pollen brush yellowish, mandibles 4-dentate.

.....*Andronicus*, 2054, *cylindricus* Cr.

Nova Scotia to Manitoba, VI, VII.

Smaller, length 7 to 8 mm., clypeus more coarsely punctured than vertex, cubital nervure between first transverse cubital

and first discoidal about half the length of first transverse cubital nervure, pollen brush white, mandibles 3-dentate. .....*Alcidamea*, 2052, *simplex* Cr. (=*producta* Cr.). Throughout settled part of Canada.

17. Eyes not hairy, ♀ with pollen brush, ♂ has on dorsal segment 6 a high transverse ridge, or crest, which forms the apex of abdomen, mandibles in ♂ with a large tooth beneath ..... *Megachile*, Lat.

Eyes hairy, ♀ without pollen brush, tip of abdomen of ♂ spinose, of ♀ acuminate.....*Cœlioxys*, Lat.

NOTE.—The author submitted the above paper to Prof. T. D. A. Cockerell, who made some suggestions, most of which have been adopted.

SOME BEES IN THE BRITISH MUSEUM.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

Andrena (Opandrena) ricardonis sp. n.

♂.—Length 9 mm; black, the clypeus lemon yellow with two black spots; hair of face, front and thoracic dorsum long and fulvous, of cheeks and underside of thorax pallid but not white; head broader than thorax; cheeks very broad, shining, obtusely subangulate below level of middle of eye; malar space almost obsolete; mandibles long, but not so much produced at end as in *A. flavoclypeata*; yellow clypeus higher in proportion to its width than in *flavoclypeata*, the yellow not approaching eyes at sides; front dull, sides of vertex shining; antennæ long, third joint longer than fourth, but not nearly as long as four and five combined; flagellum light fulvous beneath; disc of mesothorax and scutellum shining, with very sparse and minute punctures; area of metathorax small, triangular, rugose, the apical part smoother but not polished; tegulæ dark reddish; wings greyish, stigma rather small, dull amber, nervures dusky testaceous; b. n. meeting t. m.; second s. m. narrow, receiving first r. n. near its end; first t. c. not near stigma; legs slender, with hind margin of hind tibiæ, and all the tarsi, ferruginous; abdomen shining, with only very indistinct piliferous punctures, hind margins of second and following segments with

narrow ochreous hair bands, interrupted on second; apical plate (eighth ventral) broadly truncate.

Hab.—Vernon, British Columbia, June 9, 1902 (*Miss Ricardo*); British Museum. Allied to *A. trevoris* Ckll., but distinct by the colour of the antennæ and pubescence; possibly, however, a subspecies.

At Shorts Point, Okanagan Lake, B. C., June 28, 1902, Miss Ricardo took *A. medionitens* Ckll., a form with the abdominal hair bands clear white.

Nomada vicinalis aldrichi Ckll.

Male.—Vernon, B. C., May 15, 1902 (*Miss Ricardo*), Brit. Museum. New to British America.

Nomada illinoensis Rob.

Male.—Boston, Mass., Brit. Museum.

Nomada custeriana Ckll.

Male.—West Cliff, Colo., May 19, 1889, (*Cockerell*), Brit. Museum. The specimen still carries my number 9, which shows that it is one of two specimens captured; the other, determined by Ashmead as *N. parata*, is in the U. S. National Museum, and is the type of *N. custeriana*. The species has not been collected since.

Nomada vernonensis sp. n.

♂.—Length about 9 mm; robust, the head and thorax dull and rough (the face somewhat glistening), with erect dull white hair; head broad, vertex elevated, eyes pale grey; head and thorax black (with no red), the thorax with tubercles yellow, but no other light markings; mandibles (except rufous ends, which are simple), labrum (which has an apical patch of hair, but no tooth), band on lower margin of clypeus (narrowest in middle), and narrow lateral facemarks (shaped like the head and slender neck of a bird, upside down, ending narrowly but abruptly about level of antennæ), all bright yellow; posterior orbits wholly black; antennæ long, robust, not denticulate, third joint conspicuously shorter than fourth, but much more than half its length; scape black and red, hardly swollen; flagellum bright ferruginous, the basal half heavily

marked with black above; area of metathorax rugose, but apically with a pair of shining bosses; tegulæ large, pale testaceous, black at base, and with a yellow mark posteriorly; wings clear, with a brownish apical cloud; stigma and nervures ferruginous; b. n. going well basad of t. m.; second s. m. extremely broad, receiving first r. n. far beyond middle; third s. m. above about half as broad as second; tibiæ and tarsi bright red, the anterior and middle tibiæ with a black spot behind; anterior and middle femora red, largely black beneath and at base; hind femora black, with apex and more than apical half above black; abdomen clear ferruginous; first segment with basal half black except a V-shaped red mark in middle; band on first segment, notched in middle, extremely large but widely separated patches on second, large patches on third (pointed and approaching in middle), and bands on 4 to 6, bright yellow, the bands enclosing or nearly enclosing red spots at sides posteriorly; apical plate notched; venter red, with a large deeply bilobed black basal patch, and a small yellow spot beyond middle.

Hab.—Vernon, British Columbia, April 15, 1902 (*Miss Ricardo*), Brit. Museum. A relative of *N. illinoensis* Rob., but much larger, and with the abdomen richly coloured. In the table of Rocky Mountain species it runs to 47, but is not related to the species there indicated.

SOME NORTHERN GEORGIA ACRIDIIDÆ.*

BY H. A. ALLARD, BUREAU OF PLANT INDUSTRY, WASHINGTON, D. C.

Of the musical Orthoptera, the Acridiidæ in many respects represent a less highly specialized group. Their limited musical abilities, at least, would rank them far below the more highly specialized and musical Locustidæ and Gryllidæ. At best, their stridulations are hardly more than a brief lisping, or a noisy crepitation. Some of the Acridiidæ while at rest produce, at intervals, a few monotonous lispings by sawing the hind femora

*Mr. A. N. Caudell, of the U. S. National Museum, has kindly attended to the identification or verification of all Orthoptera collected and listed in this paper.

against the edges of the folded tegmina. Others are capable of stridulating only during flight, and produce a noisy clatter which is anything but musical. Members of the Acridiidæ are strictly creatures of the sunlight and with darkness all become inactive and silent. I have never yet heard the note of any Acridian after darkness has set in. These interesting grasshoppers are also almost strictly terrestrial, and generally prefer open fields and pastures where they can find an abundance of bright sunshine and unlimited room for their noisy aerial performances.

Whatever the true significance may be, the predominance of green, brown and black in the coloration of the Acridiidæ seems to indicate that these colours may have a more or less protective value. The brighter colours, which may be very beautifully patterned, are usually confined to the thin, parchment-like under wings, and are thoroughly concealed by the tegmina when the insect is at rest.

Among the Acridiidæ there are many species which possess no powers of stridulation. Notwithstanding this, these insects in many other ways are very interesting. Smallest of all the Acridiidæ and among the most interesting are the odd-shaped grouse-locusts. These tiny creatures, which leap almost as actively as fleas, are exceedingly difficult to discern in their natural environment of earth and dead vegetation. As one sweeps a net over the surface of the dry leaves in the woods there is an audible rustling as the tiny creatures hop about very much like tiny toads. At rest, their odd little bodies and sombre hues of greys, yellows and browns assimilate them perfectly with the mottled carpet of dried leaves, grasses, pebbles, bits of dead bark and woods among which they dwell.

Most of the Acridiidæ mentioned in this paper were observed in the vicinity of a small settlement in Jackson County known as Thompson's Mills, and situated about five miles west of Hoschton, near the intersection of the counties of Hall, Gwinnett and Jackson.

Tettix arenosus Burm. This grouse-locust is probably a common species at Thompson's Mills. It is found among dry leaves in upland woods.

Tettix hancocki var. *abbreviatus* Hancock. This sombre-hued

little insect is common in the short grass of dry, upland pastures at Thompson's Mills. Such localities are more or less interspersed with young pines. Here I have found only the form with the short pronotum (*abbreviatus*). These grasshoppers are strictly terrestrial, and leap about in the short, scanty grass where their dull colours and mottled patterns make them very inconspicuous. These insects appear to be without stridulatory powers.

Tettigidea lateralis Burm. This grouse-locust is considerably larger than the preceding, and is not uncommon at Thompson's Mills. It occurs in the short grass of dry, upland fields and pastures in late summer in company with the preceding species. The var. *polymorpha*, Burm., occurs in similar situations.

Paratettix cucullatus Burm. Among leaves on sunny, thinly wooded slopes and banks near brooks, etc. Probably common at Thompson's Mills.

Nomotettix compressus Morse. Probably common at Thompson's Mills. It occurs on banks, in pastures, open woods, etc.

Neotettix rotundifrons Hancock. In upland pastures and sunny, thickly wooded hillsides.

Tryxalis brevicornis (L). This somewhat cone-headed Acridian seems to be locally distributed and not common at Thompson's Mills. I found it in only one locality among some rank meadow grasses bordering a small stream. Here only a few individuals were observed and these were exceedingly difficult to approach or capture, owing to their shy habits and rapid flight. No note has been observed for this species.

Eritettix carinatus Scudd. I first met this little Acridian early in April at Thompson's Mills, in an old pasture grown up to broom grass. It does not appear to be common in this locality. It keeps well down in the grass, moving about occasionally to stridulate. If it leaps and alights near the top of a grass stalk, it moves backward down the stalk until near the ground. Its notes are faint, lisping phrases of a few seconds duration, and are at intervals repeated six or eight times in quick succession: sic-a-sic-a-sic-a-sic-a-sic-a-sic—sic-a-sic-a-sic-a-sic—sic-a-sic-a-sic-a-sic-a-sic. This grasshopper is most active when the sun is shining. Its notes resemble those of *Stenobothrus curtipennis* very much,

and are produced in the same manner by sawing both thighs simultaneously upon the edges of the tegmina.

Orphulella pratorum Scudder. In dry fields and pastures in upland situations, Thompson's Mills. I have recognized no stridulation for this grasshopper.

Chortophaga viridifasciata De Geer. This dimorphic species is exceedingly common at Thompson's Mills, and is the earliest to appear in March. It is generally distributed, being found in alfalfa fields, dry pastures, etc. The brown form, *infuscata*, is equally abundant. The notes of this insect are a noisy crackling produced during flight.

Hippiscus rugosus Scudder. Very common in dry pastures and old fields at Thompson's Mills. A most clumsy, inactive locust and readily captured. It seems to have no distinct stridulation.

Dissosteira carolina L. This widely distributed grasshopper is a very common one at Thompson's Mills. It shows everywhere a preference for the bare soil of roadsides and fields. In such situations its dull gray and brown mottlings make it almost appear a part of the naked soils upon which it alights. The notes of this grasshopper are most peculiar. It ascends a few feet above the ground and, hovering in mid-air for some seconds, flutters its wings and produces a continuous lisping note. This mid-air performance is quite distinct from the usual flights of this insect, which are nearly or quite noiseless.

Trimerotropis citrina Scudder. This insect is a common one at Thompson's Mills, perferring the bare soil of roadsides and cultivated fields as does *Dissosteira carolina*. I have recognized no note.

Schistocerca americana Drury. This is a common grasshopper at Thompson's Mills, occurring almost entirely in dry situations in the vegetation of fields and in weeds and cotton plants. It is a shy species, and possesses vigorous powers of flight. Except for a rustling of the ample, transparent wings during flight, it has no definite stridulation.

Schistocerca alutacea Harris is less common than the preceding. It prefers the tall weeds and grasses of old fields. Its flight, like

that of the preceding, is vigorous and unaccompanied by any definite notes or stridulation.

Schistocerca damnifica Saussure. A common grasshopper at Thompson's Mills, occurring in upland fields and along roads. It is especially common in cotton fields. Unlike the two preceding species of this genus, which usually rest upon weeds or other vegetation, this species prefers to rest upon the bare earth. If frightened, it flies away silently and then may alight upon cotton or other plants. It seems to have no note. The almost uniformly reddish-brown colour of *Schistocerca damnifica* makes it quite indistinguishable from the red-land soils of northern Georgia. This insect appears rather late in summer.

Melanoplus scudderi Uhler. In early October, 1910, I found this short-winged grasshopper very common in the short grass and leaves in thin woods in certain dry, upland situations. At first sight one is ready to consider it only a nymph from its almost wingless appearance. It is an active insect and leaps readily when disturbed. Its dark gray and brown coloration make it very inconspicuous among the leaves, sticks and bogs of its native environment. It does not appear to be an open field species in this locality. Here its abundance seems to be very variable with different seasons.

Melanoplus femoratus Burm. Not uncommon at Thompson's Mills, in old fields. I have recognized no note.

Melanoplus atlanis Riley. This grasshopper is a very common species at Thompson's Mills, occurring in all upland fields and pastures, together with *Melanoplus femur-rubrum*, De Geer. I have observed no stridulation.

Melanoplus punctulatus Scudder. A very common species in all upland fields at Thompson's Mills, together with *M. femur-rubrum*. I have identified no note which it may produce.

Melanoplus femur-rubrum De Geer. An exceedingly common grasshopper at Thompson's Mills, in all upland situations, but especially so in grassy pastures. Its flight is noiseless and I have noted no stridulations while at rest. Scudder says he has seen the male sawing on its tegmina with its femur, but could detect no noise.

Syrbula admirabilis Uhler is also a very common Acridian at Thompson's Mills, especially in the dry fields grown up to broom grass. The male is rather musical, producing a weak, lisping stridulation at intervals—s-s-s-s—s-s-s-s-s-s-s, by sawing the hind femur upon the edges of the tegmina.

Arphia xanthoptera Burm. A common locust in old fields at Thompson's Mills. The notes are a loud, harsh crackling, accompanying their flights across the fields.

Arphia sulphurea Fabr. In fields, pastures, etc. A noisy crepitation during flight is the only method of stridulation.

Spharagemon bolli Scudder. Very common in old fields at Thompson's Mills and in pastures. It has been observed that this grasshopper sometimes hovers in air and produces a rustling note similar to the habit of *Dissosteira carolina*, but I have not witnessed this myself. The usual note is a rattling noise during flight.

The Acridiidæ confine their habitat almost entirely to the ground stratum, whether in wood or in field. Few species regularly prefer the true herbage or shrub stratum of vegetation, as do many members of the Locustidæ and Gryllidæ. Even those species which appear to prefer wooded situations confine themselves to the more open, sparsely grassy areas as *Melanoplus scudderi* and some of the Tettiginæ. I have found no species inhabiting deep woods where the ground is hidden with dense herbage. Orthoptera of all kinds are uncommon in such situations.

Tryxalis brevicornis perhaps belongs more strictly to the true herbage stratum of vegetation than any other species listed in this paper.

The species of *Schistocerca*, i. e., *americana*, *alutacea* and *damnifica*, do not confine themselves strictly to the ground stratum, nor can they be considered truly members of the herb and shrub strata. They are somewhat elastic in their habits, however, and show a more marked tendency to choose the habitat of the higher leaf and shrub strata occasionally, than do most Acridiidæ.

This does not by any means complete the list of Acridians probably occurring at Thompson's Mills, but many years of patient study and collecting must be pursued to determine the Orthoptera inhabitating any region, and to become familiar with their habits and stridulations.

A REVIEW OF THE PTEROCOMMINI (APHIDIDÆ HOM.).

BY A. C. BAKER, WASHINGTON, D.C.*

A few years ago the writer undertook a study of the Pterocommini. In this he was helped, in her usual generous manner, by Doctor Patch, who sent slides of some different species, and by Professor Gillette, who loaned the writer slides of the specimens he had. The recent paper by Wilson (1915) on this tribe has called the writer's attention again to the species. It seems worth while, therefore, to publish a few notes on the group, since the writer's study showed some points at variance with the results published by Wilson, and since *Pterocomma populifoliæ* Fitch should be reinstated.

In regard to the genera, the writer believes Wilson's view correct, but in regard to species interpretation he is unable to agree with him. These points of difference will be noted under the species.

Pterocomma populea (Kalt.).

Two American species are made synonyms of this by Wilson. They are *beulahensis* Ckll., and *rufulus* Davidson. *Rufulus* as indicated by specimens from Davidson is quite a different species. The cornicles of *populea* from Spandau, Prussia, are about equal in length to the hind tarsi. In *rufulus*, however, the cornicles are nearly twice the length of the hind tarsi, bearing about the same ratio as do those of *bicolor* Oest. Although *rufulus* proves to be distinct from *populea*, it becomes a synonym of *populifoliæ* Fitch, a species not mentioned by Wilson.

Pterocomma populifoliæ (Fitch).

Populifoliæ was described in 1851, and Fitch's notes give the following numbers as representing the species: Nos. 6118-6121, Nos. 9292-9302 and No. 3712. These are Fitch's personal numbers; not the State Cabinet numbers. Of these numbers the following

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are now present in the National Museum collection: 9292, 9293, 9297, 9390 and 9301. A study of these specimens shows that *rufulus* agrees with *populifoliæ* Fitch. Oestlund (1887) considered Fitch's species to be a Chaitophorus, and so described his *populifoliæ*. Davis (1910) considered it an Aphis, and described another species under the name. Both of these writers expressed doubt as to their determination. In the writer's opinion, *populifoliæ* stands as a good species, easily distinguished from *populea* by the relative lengths of the cornicles and tarsi.

The measurements for the alate viviparous female of this species average: Antennæ III, 0.64 mm.; IV, 0.368 mm.; V, 0.336 mm.; VI, base and unguis (0.192 mm.+0.288 mm.); cornicle, 0.352 mm.; hind tarsus, 0.24 mm.

Specimens taken on Popof Island, Alaska, and determined as *populea* by Pergande, are certainly *populifoliæ*. Pergande concluded that both Kaltenbach and Koch were wrong in stating the cornicles of *populea* to be cylindrical, and he was of the opinion that, "in fact, they are clavate." So, indeed, they are in *populifoliæ*, but the cornicles of *populea* are very plainly cylindrical, and in this regard Koch's figure is excellent and the descriptions of Kaltenbach and Koch exact. The Pergande Alaska specimens, now in the collection of the Bureau of Entomology, show the following measurements for the alate viviparous female: Antennæ III 0.656 mm.; IV, 0.4 mm.; V, 0.384 mm.; VI (0.208 + 0.384 mm.); cornicles, 0.38 mm; hind tarsus, 0.25 mm.

It will be seen that these measurements agree almost exactly with those given by Wilson for *populea*. But he gives no measurements of the hind tarsus. It will be seen also that these specimens agree with *populifoliæ* Fitch, and it is the writer's opinion that the specimens measured by Wilson were specimens of *populifoliæ* Fitch. Specimens of American *populea* show that species to be very different from *populifoliæ*. This is most apparent in comparing the cornicles and hind tarsi. Measurements for the alate viviparous female of this species are as follows: Antennæ III, 0.608 mm.; IV, 0.256 mm.; V, 0.24 mm.; VI (0.128 mm. + 0.144) mm.; cornicles, 0.192 mm.; hind tarsus, 0.192 mm. These figures indicate clearly the striking difference between the two species.

Now specimens of *populea* from Europe agree exactly in measurements, etc., with American specimens, excepting that the unguis of segment VI is very slightly longer. Moreover, the examples of both species have a much more cylindrical cornicle than have the specimens of *populifoliæ*. The writer is therefore considering these American specimens to be *populea*. The European examples have segment VI usually about (0.128 mm. + 0.17 mm.).

In regard to *pilosa* Buckton, the writer has never had an opportunity to study forms supposed to be this species. From the description given by Buckton, it would seem very much as if he had two species before him. His apterous forms would very well agree with *populea*, whereas his alate form seems to be *populifoliæ*, or a species near it. This will be seen from the measurements he gives for the cornicles in the two forms. Since Pergande, who had seen the type, placed *pilosa* as perhaps the same as his *populea*, this would also tend to indicate that Buckton's alate form is *populifoliæ* Fitch.

Pterocomma beulahensis (Ckll.).

The measurements given for this species by Cockerell would make it very difficult to include it under *populea*. It has, however, the cornicles about equal in length to the hind tarsi. The type slide of the species is now in the National Museum collection, and on it are mounted four alate specimens. These show some variation in the sixth antennal segment. One antenna measures for (0.176 mm.+0.336 mm.), and one (0.16 mm.+0.32 mm.). It will be seen that this proportion is very different from that of *populea*. A more prominent character, however, is met with in the beak. In all our specimens of *populea* the beak is long, reaching beyond the hind coxæ, sometimes even to the base of the cornicles, or very near them. The beak in *beulahensis* is much shorter, extending hardly to the hind coxæ, sometimes not reaching them. The cornicles are somewhat swollen, a character which is not so evident in *populea*. Moreover, *beulahensis* is more elongate, having the general look of *populifoliæ*, whereas *populea* has a shorter, "bulkier" appearance.

Pterocomma salicis (L.).

Under this species Wilson discusses the forms determined as *salicis* L. in this country. He concludes that the species does not occur here, and considers the cornicle the distinguishing character. While the cornicles figured by him are very distinct, the writer has examined both American and European specimens in which the cornicles are almost identical. They are not only the same in shape, but the measurements are the same, and a range in variation between the two types is met with in European material. It is not probable that two European species are confused since the variation was seen in aphides collected from one colony in France. Another point of resemblance is the bright orange colour of the cornicles in both European and American forms. It is true that the cornicles of American forms seldom show the distinct bulging met with in *salicis*, but with the variation in the European form, and with the two forms showing the same measurements, it seems hardly possible to separate them on this character of the cornicles. Both European and American forms, moreover, show a more or less distinct dusky bordering to the wing veins.

In an attempt to find some other character to back up the variation in the European cornicle and so to separate the American form, the writer has measured a large series of apterous forms. These have shown no differences. The European form shows more variation in the antennal segments, the third segment particularly being sometimes longer in the European than in the American form. In others, however, they are exactly the same, and this is more often the case than otherwise. This variation in the antennal segments does not seem to be, therefore, any definite character upon which the two species can be separated with certainty. In the meantime, therefore, the writer prefers to hold *salicis* for the American forms.

Measurements of the alate viviparous female of both American and European specimens will show their remarkable similarity in this respect.

European: Antennæ III, 0.72 mm.; IV, 0.464 mm.; V, 0.432 mm.; VI, (0.224 mm.+0.224 mm.); cornicle, 0.56 mm.; hind tarsus, 0.256 mm.

American: Antennæ III, 0.7 mm.; IV, 0.448 mm.; V, 0.384 mm; VI, (0.208 mm.+0.224 mm.); cornicle, 0.544 mm.; hind tarsus, 0.24 mm.

It will be seen from these measurements that the European and American forms are the same as far as proportions are concerned, and considering the great variation met with in the cornicles of the European, and even of the American examples, there does not seem sufficient basis in the writer's opinion for keeping the species distinct. Certainly the two forms are much more nearly alike than are the American form and *bicolor* Oestlund.

Pterocomma bicolor (Oest.)

The American specimens listed under this species by Wilson do not, the writer believes, belong here. Oestlund gives the length of cornicles as 0.35 mm., whereas Wilson gives them as 0.59 mm.; fully equal to those of *salicis*. The following measurements of the alate viviparous female made from specimens of *bicolor* collected by the writer in Ontario show that Wilson's *bicolor* measurements refer not to this species at all, but perhaps to variations of *salicis?* The cornicles of *bicolor* are quite distinctive and the same as given by Oestlund in his description.

Measurements of alate viviparous female: Antennæ III, 0.672; IV, 0.38 mm.; V, 0.36 mm.; VI, (0.16 mm.+0.352 mm.); cornicles, 0.352 mm.; hind tarsus, 0.22 mm.

It will be seen that this species is separated from *populifoliæ* by the proportions of segment VI of the antenna. The base is much shorter and the unguis much longer than in Fitch's species. This character may not be a constant one, and in such case *bicolor* will become a synonym. In the National Museum collection there are specimens determined as *bicolor* by Williams. According to Davis (1911) this determination has been confirmed by Oestlund. Williams' specimens in the collection are certainly *populifoliæ*. The measurements of segment VI, of the two alate specimens present are (0.176 mm.+0.288 mm.) and (0.176 mm.+0.27 mm.). Comparing these with measurements of one specimen in Fitch's collection, which measures (0.144 mm.+0.256 mm.), we see that

there is little difference in proportions. The Ontario material collected on the Karwatha Lakes is uniformly different from this, averaging as previously given (0.16 mm.+0.352 mm.). One specimen had the measurements (0.16 mm.+0.384 mm.) and one (0.176 mm.+0.352 mm.). These measurements agree in proportion with those given by Oestlund, and the writer, therefore, prefers to hold *bicolor* as distinct on this basis until large collections can be made and studied.

In regard to the species *flocculosa* Weed, *smithiæ* Mon., and *salicti* Harris, no remarks will here be made, since these species are fully dealt with by Wilson, and the writer has examined some of Weed's specimens, but a species described by Patch (1913) as *antennatum* should be mentioned. It cannot be definitely described in full until alate forms have been found. Another species has been described as *farinosus* by Del Guercio (1913). In this species the cornicles are cylindrical, but very much longer proportionately than those of *populea*.

Pterocomma steinheili (Mordwilko)

A third species, not mentioned by Wilson, is one named *steinheili* by Mordwilko. Through the kindness of Mr. J. J. Davis, I have been able to examine a slide of specimens received by him from Mordwilko. One alate form and several apterous ones are present. The species is very close indeed to *beulahensis* Ckll., and it is the writer's belief that the two are identical. There is one marked difference, however, between the alate specimen of *steinheili* and those of *beulahensis*. The lateral tubercles of the abdomen of *steinheili* are nearly twice the size of those of *beulahensis*. It is quite probable that this is a variable character and that the two species cannot be separated by means of it. Since, however, only one specimen of the alate form of *steinheili* is available for study, it is necessary on this basis to keep them distinct.

Measurements of the alate viviparous female: Antennæ III, 0.432 mm.; IV, 0.288 mm.; V, 0.32 mm.; VI (0.16 mm + 0.272 mm.). Cornicle, 0.256 mm.; hind tarsus, 0.224 mm.

This will then leave the species as follows:

Pterocomma populea (Kalt.)

Synonymy: *Aphis populea* Kaltenbach.
Cladobius populeus (Kalt) Koch.
Pterocomma pilosa Buckton (apterous form).

Pterocomma farinosa (Del Guercio).

Synonymy: *Cladobius farinosus* Del Guercio.

Pterocomma steinheili (Mordwilko).

Synonymy: *Cladobius steinheili* Mordwilko.

Pterocomma salicis (L).

Synonymy: *Aphis salicis* Linne.
Melanoxanthus salicis (L) Buckton, Weed, etc.
Melanoxantherium salicis (L) Schouteden.
Pterocomma salicis (L) Wilson.
? *Pterocomma bicolor* Wilson, *not* Oestlund.

Pterocomma populifoliæ (Fitch).

Synonymy: *Aphis populifoliæ* Fitch.
Pterocomma pilosa Buckton (alate form).
Cladobius populeus Pergande, *not* Kalt.
Cladobius rufulus Davidson.
Melanoxanthus bicolor Williams, *not* Oestlund.
Melanoxantherium rufulum (Davidson) Essig.
Pterocomma populea Wilson, *not* Kalt.
? *Melanoxantherium salicti* Patch.
. *Cladobius beulahensis* Wilson, *not* Cockerell.

Pterocomma flocculosa (Weed).

Synonymy: *Melanoxanthus flocculosus* Weed.
Melanoxantherium flocculosum (Weed) Schouteden
Pterocomma flocculosa (Weed) Wilson.

Pterocomma smithiæ (Mon.).

Synonymy: ? *Aphis salicti* Harris.
? *Aphis salicicola* Uhler.
Chaitophorus smithiæ Monell.
? *Lachnus salicicola* (Uhler) Thos.
Melanoxanthus salicti Weed.
Melanoxantherium smithiæ (Mon.) Gillette.
Pterocomma smithiæ (Mon.) Wilson.

Pterocomma bicolor (Oest.)

Synonymy: *Melanoxanthus bicolor* Oestlund.
Melanoxantherium bicolor (Oestlund) Patch.

Pterocomma antennata (Patch)

Synonymy: *Melanoxantherium antennatum* Patch.

Pterocomma beulahensis (Ckll.)

Synonymy: *Cladobius beulahensis* Ckll.

A few misprints are noted in Wilson's paper. On page 347, in listing the described species, *beulahensis* and *salicicola* are misspelled. Cockerell, the author of *beulahensis*, is written as if it were part of the specific name. The citation of "*lanthaniæ*" is different on page 347 from the citation of the species on page 357. If *lantanæ* Koch is not a Pterocomma, as Wilson believes, and if the name is retained as he retains it, it must become *P. lantanæ* (Pass) based on the description of the oviparous female in Aphididæ Italicæ, p. 55. Passerini spelled the name *lantanæ*, but a new one would be required,

The names listed under *salicis* (Linn.) should be altered as follows: *Aphis salicis* should be in italics. In the lines following, Linn. should be in parenthesis, while the names of the other authors should not be. In the synonymy of *flocculosa* Weed, the first reference should read Melanoxanthus, and Weed should not be in parenthesis. In the synonymy of *bicolor* Oest , where the genus is cited as Melanoxanthus, Oestlund should not be in parenthesis.

In the synonymy of *populea* Kalt., the third reference, Cladobius should be omitted and Kalt. inserted in parenthesis after *populeus*. Whether or not the word was written thus, and not Cladobius, I have been unable to prove. The first edition of Passerini's Gli Afidi was published in 1857. I have not been able to see this nor the 1860 Parma edition Wilson's reference, however, is incorrectly written. So also is his reference to Aphididæ Italicæ, 1863. *Pilosa* Buckton is cited twice. In the second citation it is indicated that the species was not described as a Pterocomma, but was referred to that genus by Wilson. In writing the name *populea* in connection with Pterocomma, Kalt. should be in parenthesis.

On page 355 *Aphis salicis* Harris is discussed. This is a misprint for *salicti* Harris, named on page 191 of the first edition of Harris' work. The same is seen in the citation of Oestlund, etc. In listing *smithiæ* as a Pterocomma, Monell, which is incorrectly spelled, should be in parenthesis.

In the list of species on page 347, the genera in which they were originally described are placed in parenthesis between Pterocomma and the specific name. This is the method given in the international code for the indication of subgenera.

All of these little details are very minor matters, but they are here mentioned for purposes of reference.

Key to the Species of Pterocomma

1. Cornicles without a distal flange and abruptly constricted at the distal extremity ..... *flocculosa.*
   Cornicles with a distal flange and not so abruptly constricted at their distal extremities ..... 2.
2. Cornicles about twice as long as their greatest diameter ..... *smithiæ.*
   Cornicles much more than twice as long as their greatest diameter ..... 3.
3. Cornicles about equal in length to the hind tarsi ..... 4.
   Cornicles much longer than the hind tarsi ..... 6.
4. Beak reaching to the cornicles or nearly to them ..... *populea.*
   Beak reaching only to the hind coxæ or not quite to them ..... 5.

5. Lateral tubercles of the abdomen about equal in length to the second antennal segment.....*steinheili.*
   Lateral tubercles of abdomen considerably shorter than the second antennal segment.....*beulahensis.*
6. Cornicles nearly twice as long as the hind tarsi.....7.
   Cornicles much more than twice as long as the hind tarsi.....8.
7. Unguis of segment VI of antennæ about equal in length to the cornicle and more than twice as long as base.....*bicolor.*
   Unguis of segment VI of antennæ usually shorter than the cornicle and less than twice as long as base.....*populifoliæ.*
8. Cornicles cylindrical or slightly tapering.....*farinosa.*
   Cornicles much swollen in the middle.....9.
9. Cornicles bright orange in colour.....*salicis.*

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1913. Del Guercio, G.—Generi e Speci Nuove di Afididi—Redia IX, p. 178.

1915. Wilson, H. F. —A Synopsis of the Aphid Tribe Pterocommini—In Annals of the Ent. Soc. of America, Vol. VIII, p. 347.

The remaining literature on the tribe is cited in Wilson's paper.

A NEW NOCTUID GENUS.

BY WM. BARNES, M.D., AND J. McDUNNOUGH, PH.D., DECATUR, ILL.

The publication by Dr. Skinner (Ent. News, 1902, XIII, 141) of the species *Psychophora fasciata*, from Alaska, evoked considerable discussion at the time regarding the position of the species (whether a Noctuid or Geometrid), and also concerning the genus *Psychophora* Kirby and its type *sabini* Kirby (Ent. News, 1902 XIII, 191; l. c. 1903, XIV, 193). In the latter paper Dr. Dyar, in the belief that *fasciata* corresponds closely to the generic characters given for *Psychophora*, leaves the species along with *sabini* in that genus, and creates the genus *Skinneria* for *frigidaria* Gn., which he considered wrongly associated with *sabini* Kirby.

In the 4th Volume of Seitz Macrolepidoptera Palæarctica (Geometridæ) Mr. Prout (p. 232) sinks *Skinneria* to *Psychophora*, placing *frigidaria* Gn. in this genus. In reply to a query of ours regarding this action, he has kindly replied that there is a series of specimens under the name *sabini* in the British Museum from Grinnell Land, which "agree so perfectly with Curtis (and well with Kirby) that one cannot hesitate as to the rightness of their determination, especially as the localities are in the same main geographical region, and there is no knowledge of any rival claimant from thence." He further states that *frigidaria* Gn. from Norway, Lapland, etc., "seems evidently a mere local race of *sabini*," but that *phocata* Moesch, according to the figure, is a distinct but closely allied species. All these species he considers to be typical Larentiids. Regarding *fasciata* Skin. he was unable to speak definitely, as he had no material of this species.

The above remarks led us to examine more closely our specimens of *fasciata*, of which we have four ♂'s from the type locality, two of them being co-types. We find that Dr. Dyar in his otherwise excellent characterization of the generic characters of *fasciata* (Ent. News XIV, 194) has overlooked the fact that the mid and hind tibiæ are *well spined*. This fact would almost with certainty prove the species to be a Noctuid, and it would fall into the family *Agrotinæ* of Hampson, which reference would be further supported by other structural characters, notably the obsolescence of vein 5 on the secondaries from near the middle of the cell. With regard

to the two characters which have led *fasciata* to be considered a Geometer, *viz.*, the fovea at base of primaries and vein 5 of primaries arising from the middle of the cell, we cannot accept either of these points. The so-called fovea is apparently caused by a distinct bifurcation of vein 1 at the base, the space thus included by veins 1 and 1c being somewhat devoid of scales, which in any case are rather sparse on the underside. Regarding vein 5, all our specimens show this vein *distinctly below* the middle of the cell, rather more distant, it is true, from 4 than is usual, but slightly curved downward towards 4 at the point of origin. The antennæ are, in our opinion, very strongly lamellate, giving practically the appearance of bipectinations; the eyes rather small and reniform.

As there is apparently no generic name available for the species, we would propose the name BARROVIA (the species being taken at Pt. Barrow) with type *fasciata* Skin., and would place the genus in the vicinity of *Agrotiphila* Grt., from which it differs by its unspined fore tibiæ and hairy vestiture.

For generic characteristics other than the above-mentioned, we would refer to Dr. Dyar's paper as already quoted.

BOOK REVIEW.

THE LIFE OF INLAND WATERS. An elementary text book of fresh water biology for American students. By James G. Needham, Professor of Limnology in Cornell University, and J. T. Lloyd, Instructor in Limnology in Cornell University. The Comstock Publishing Co., Ithaca, N. Y., 1916. 438 pp. Price, $3.00.

This is a work that will appeal to many classes of readers, including entomologists working in various fields of special study. It deals with a subject of immense scope, which has been developed gradually through the accumulated researches of innumerable investigators and has only recently acquired the status of a coherent science.

The vast array of facts embodied in this literature has been thoroughly sifted and assimilated by the authors, and the result is an admirably planned and most attractive presentation of the elements of limnology or fresh-water biology.

After an interesting chapter on the history and development of this science, the authors discuss the physical and chemical properties of water, and of natural bodies of water, regarded as aquatic environments, and also the interrelations of land and water. This is followed by a general account of the various types of aquatic environments, under the sub-headings: "Lakes and Ponds," "Streams," and "Marshes, Swamps and Bogs."

The fourth and longest chapter deals with types of aquatic organisms, these being described briefly in untechnical language, particular attention being given to their mode of life and such features of form and structure as indicate their fitness for their particular environment.

This and the two following chapters, entitled "Adjustment to Conditions of Aquatic Life" and "Aquatic Societies," contain much entomological matter. The latter two chapters are of exceptional interest to the biologist, and it is doubtful if there is anywhere to be found a more admirable analysis of the ecological relations of fresh-water organisms.

In the concluding chapter, "Inland Water Culture," the subject is discussed from the economic standpoint, and the possibilities of utilizing the extensive areas of swamp and marsh in North America for intensive fish-culture are clearly demonstrated. Nor are the aesthetic and educational aspects of the subject forgotten, and the authors show their breadth of view in this connection in advocating the preservation of wet lands in part as sanctuaries for wild life.

Throughout the book it is the ecological point of view that is emphasized rather than the systematic and morphological, and from this standpoint there is much that is of great interest to students of all groups of aquatic insects.

The illustrations are numerous and attractive, many of them being reproductions of original photographs and photomicrographs. The chief defect is the somewhat large number of typographical errors, which will doubtless be corrected in a future edition.

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POPULAR AND PRACTICAL ENTOMOLOGY.

A Visit to Niagara Glen.

BY FRANCIS J. A. MORRIS, PETERBOROUGH, ONT.

After nearly all July sacrificed on the altar of one's profession, three solid weeks of our all too short Canadian summer gone up in smoke and stifling city heat—weeks, too, when every self-respecting entomologist should be clinging perilously at the very top of his bent—it was indeed high time for relaxation. I hurried feverishly down to the Yonge St. wharf and boarded a Niagara boat. I had told no one where I was going, least of all myself. My preparations were stealthy and the contents of my pilgrim's scrip of the most meagre. In one pocket (had you picked it) you would have found a tooth-brush, a comb, a cyanide bottle, and two clean handkerchiefs; in another a small plant-press, made of two stout cardboard covers enclosing a dozen sheets of blotting paper, and carefully tied up with a pair of brown laces, borrowed for the nonce from my Sunday boots; in a third an empty tin of Colgate's shaving-stick (serving the double purpose of a drinking cup and a receptacle for larvæ and other specimens that required preserving alive), a compass, a chisel, and a pair of forceps; while in an inner pocket (defying the Artfullest Dodger to touch) — with perhaps an occasional roguish peep abroad—bulged unabashed (or snuggled contentedly, according to your view of it) a negligé shirt, of a pattern much in vogue a decade or two ago, wrapped closely round a collapsible insect net.

It was already growing dusk when I was landed at Queenston village and reported at the quiet, old-fashioned boarding-house where my habits and hobbies being known were no longer subject to comment or disconcerting question. After making arrangements for a night or so's lodging and an early start next morning, I strolled out through the gathering dusk in the direction of the woods at the foot of Brock's monument; after turning a little way down a lane skirted by grapevines, I presently became

aware, on all sides, of tiny rustlings in the foliage, prelude to the drowsy hum and blundering flight of shard-borne beetles; a sound familiar enough, and one that should have surely set me down not more than two or three years or 100 miles away—in the school playground, say, Port Hope, at the height of the June-bug season; but there must have been something peculiar in the keynote of this symphony, for it set vibrating a far more distant chord of memory: a little tilt between the mind's deft fingers, one magic turn of the kaleidoscope we call imagination, and on the instant I found myself a schoolboy in a narrow Kentish lane between chestnut trees and hawthorns, watching at dusk for cockchafers and the occasional prize of a stagbeetle soaring out of the hedgerow. I had no net with me, and though I could tell the beetles were larger than June bugs, capture was out of the question, so I turned in for the night.

Next day I was heading towards the Heights before 6 a.m. For some time I stuck to the main road, for the dew was very heavy; but near the Monument Station I sensed unmistakably the neighborhood of a certain fungus, and following my nose like a questing hound, presently spied, by a clump of red cedar, a small colony of what I was in search of—*Ithyphallus impudicus*—"Stinkhorns," to use the vulgar and all too expressive name. Two of the horns, already sinking into putrescence, were tenanted by nearly a score of silphids, dark-winged and with reddish margin on the thorax.

From here, as it was too early for the car-service, I tramped up the belt railway towards the Glen; the sides of the track showed plenty of New Jersey Tea, but it was too soon in the day for insect visitors; on some plants of purple vetch I found great numbers of "the old-fashioned Potato-beetle" (*Macrobasis unicolor*) feeding; and a couple of miles further up, when I was within a few rods of the Glen enclosure, it being after seven o'clock, with the sun hot and strong in its course, came gliding out towards me from the shrubbery that fringed the lip of the gorge, a magnificent yellow-banded snake, larger and stouter than any garter snake I had ever seen before; forward he drove with that wonderful motion that, unaided by limbs, yet rivals in grace and mastery of self-control the most perfect athlete's—rigidity and suppleness

combining to create a new and altogether unique form of energy. I stood between the tracks and watched his advance; strong enough, it looked, to overthrow quite a massive obstacle or thrust it aside, yet gently gliding about a blade of grass without bending it, or flowing like oil round the sides of a stone. Not the slightest notice of me did he take, but lay out along the sand within a foot of the rail and basked in the sun. I stepped over to that side of the track and looked down at him; first his head and neck, and then the markings on his back. There was something strange to my eye in the appearance of this garter snake; the broad zig-zag bands of yellow seemed unfamiliar; the colour itself was not the waspy straw yellow I was expecting, but darker in part, almost red-ocre, like a British hornet; I glanced at the tail: one, two, three, four, five naked joints; it was my first rattlesnake. Just then the rumble of an approaching car forced me to step from the tracks; I had no desire to be marooned for even a moment alone with a rattler on a narrow strip of cliff-edge, so I chose the other side of the right-of-way. As soon as the coast was clear, I returned to my scrutiny; the snake had not moved, though the car had lumbered by within a foot of him, out-rattling a thousand of his kind; but he was startled, probably by the vibration of the ground, and almost immediately slid back into the bushes and so (doubtless) down to the ravine. The keepers at the Glen had not seen one all the season and showed surprise, if not annoyance, that I had not killed this fellow. Snakes are none of them aggressive, but the rattler is, I believe, more than ordinarily sluggish; unless cornered or accidentally stepped upon or jostled, he is perfectly harmless, and in cold weather can be picked up and handled with impunity.

In the rich herbage beside one of the paths that led to the flight of wooden stairs I noticed numbers of little chrysomelians feeding, at least three species, two of them black with four yellow or reddish spots on the elytra (2 basal and 2 apical), one of the beetles proving *Bassareus* and the other *Cryptocephalus*; the third species was of a uniform dark-grey and quadrate in outline, apparently *Pachybrachys*.

I had now reached the Glen itself, and proceeded to hobnob for an hour or two with some old cronies among the ferns. It ap-

pears that when the Glen was Foster's Flats, it harboured a few plants of the Holly Fern (*Polystichum lonchitis*), and I had planned to hunt for this plant, first downstream away from all frequented paths, and then upstream towards the whirlpool. After three hours' unavailing search downstream, I descended towards the river bank for another spell of sunshine and entomology.

Here I came upon a thicket of undergrowth—black raspberries in profusion, a tangle of grapevines, clumps of elder, and a sprinkling of basswood. Halting beside one of these last, before wading into the thicket, I let my eye range over the foliage. Presently I saw a sight that set my heart beating, a pair of tiny longicorns basking on a leaf; it was ten years since I had seen the insect—*Eupogonius subarmatus*—and then, though I had captured the only two I saw, one on a basswood log and the other on a leaf overhead, I knew them for the wariest of their kind. Cautiously as I approached, my quarry dropped off the edge of their leaf before I could get within range. I had now little hope of success, for the insect was extremely small and the ground a miniature jungle of rank grass. I stood, however, and watched the place under the leaf very closely, devouring the ground inch by inch, and presently spied the pair resting on a flat slope of stone, and captured them both with little more ado.

Nothing else was to be seen about the lower ranks of foliage on this tree, but when I got round to the side next the sunken stretch of thicket, more basswoods appeared in the open; the raspberries and the rich drapery of sunlit green beckoned imperiously; I looked at my watch; eleven a.m. The hour was auspicious for sun worship—h-h-h-h-m, bz-z-z-z-z-zm; hullo! I thought, service is just going to begin; here comes the clerk. It was *Pelidnota punctata* settling down on a grapevine, but very lively, and, what was more to the point, quite out of reach; indeed, he only stayed long enough to clear up the mystery of the night before and then make off. Without delay I stepped down into the thicket and, with an eye focussed for small creatures on grass and leaves, proceeded to range about this tangled river-glade.

There is a peculiar charm about moving cautiously through sun-lit spaces or standing at gaze like a pointer on the still hunt for tiny game in the all but breathless glare of July heat. It

takes a trained eye to render visible the sadder-hued and more sluggish forms of all this multitudinous insect life, but it was not long before I began to realize that the wilderness of my choice, so far from being a desert, was a thronging conventicle of fellow sun-worshippers. It was, I recall, while slowly poring over the surface of a tall and stately teasle, from the heart of a neighbouring berry patch, that I spied one of the first members of this congregation. At first I took it for a large yellow-and-brown-banded hymenopter, the velvety sheen of its elytra giving the effect of shimmering wings, but under the lens of my unwavering stare it soon steadied into the form of *Bellamira scalaris*, the first I had ever seen alive; unfortunately it had not come to stay through the service, for hardly had I shaken free from some clinging ropes of thimbleberry vine, than I saw the coveted object hurry to the edge of his perch and soar away into the air, translated from my gaze like some beatific vision into the empyreal vast. Possession is nine points of the law, but of entomology it seemed just then to a beetle-fancier the one and only point worth naming in his whole avocation.

My disappointment was quite keen and lasted for a long time; even now the recollection rouses a fresh pang, as an old wound will throb anew in bad weather. But other sights and better luck (both abundant that day) soon drove all this into the background. Before I left the thicket I had captured one specimen of *Oberea bimaculata* (resting, for a wonder, on the *upper* side of his raspberry leaf), one specimen of *Plagionotus speciosus*, and seven specimens of *Desmocerus palliatus*, always on the under side of the foliage of elder, usually early elder, whose blossom, long over, had been replaced by clusters of crimson berries. What a magnificent insect the Knotty Cloak is! with his gleaming wing-covers of Prussian blue based with bright yellow; unfortunately, his colours fade; cabinet specimens become actually dingy in the course of years, the yellow in particular losing all its vividness.

At the edge of the thicket, before emerging, I glanced up into a large basswood and noticed a pale yellow object apparently about the size of a cecropia moth depending from an upper leaf; it had not the thin, shrivelled sereness of dead foliage, but, whatever it was, it hardly bent the leaf or its stalk where it hung. Suddenly remembering that I had an insect net with a three-jointed handle

in my pocket, I drew it out and fitting it together scooped the enigma into the silken bag, where it writhed and struggled with moth-like flutterings; it was a tiny bat.

High up on the same tree I now spotted (in its favorite attitude) another specimen of *Eupogonius subarmatus* and conceived the happy idea of utilizing the creature's instinct of escape to secure its capture. It evidently loved to sit up on the spacious platform of a linden leaf and "take the sun"; when approached it would nearly always run (or roll) to the edge of its resting-place and drop over; all I had to do was to hold the net well under its perch and then jar the insect into activity. This went like clockwork, and I spent two or three hours in systematic search about basswood foliage. Blatchley does not mention the linden among the creature's food plants, but I took over a dozen specimens that day of *Eupogonius subarmatus*; they were all found basking on linden leaves, and, with a single exception, on being approached, they all launched themselves obligingly into the captivity of my insect net.

It was nearly three p.m. when I decided to make a trip beyond the paths, upstream, in search of the Holly Fern; I first made my way to the last drinking fountain in the Glen, a lovely cold spring that wells out from the base of a giant block of limestone. Here as I turned away refreshed, I saw dangling in an old spider's web—dead but undamaged, and surely a most unusual victim of those silken meshes—the large and handsome longicorn, *Tylonotus bimaculatus*, the only specimen I have ever taken.

From now on I was a botanist, and though I saw no signs of the Holly Fern, I had the good luck to find a little colony—three or four plants—of Ebony Spleenwort in a grove of hemlock and cedar. Altogether, it was with great reluctance and a fast-declining sun that at last I tore myself away from the Glen and took the car to the monument. Here I spent two hours searching for a wood where report had whispered to me of the Broad-leaved Beech Fern. It was, thus, already dusk when, in spite of the very doubtful clue, I brought my search to a successful close and returned to my lodgings, tired but determined to have one more look in the morning for the apocryphal and probably long extinct Holly Fern of Foster's Flats.

Next day, in order to leave lots of room for my pocket lunch as well as to compel constancy in my fern-search, I most foolishly burned my entomological boats by leaving my cyanide bottle behind. I spent all morning upstream working towards the whirlpool in a vain and tiring (or was it untiring?) search for *Polystichum lonchitis*, and at last about noon gave it up, went again to commune with my little colony of Ebony Spleenwort, and then began my homeward walk along the track.

Here I made a most exciting discovery: the New Jersey Tea blossoms, that early in the morning were quite untenanted and seemed to have lost their fragrance, were crowded with eager guests in the bright sunshine. There is no plant, in my experience, so attractive to beetles as *Ceanothus americana*, and I have a long list of its guests in the shape of captures made on its blossoms; these were mostly of the *Leptura* and *Typocerus* genera of Longicorn, but only a few days before I had added a new find among Scarabs, *Macrodactylus subspinosus*, just because the New Jersey Tea was in a new locality; and no matter how old and familiar a blossom is, I always search it carefully in hopes of new finds, if I am in a new district.

But alas! I had no collecting-bottle, nothing but a handkerchief and my Colgate's drinking cup. For some little time I made no discovery beyond a variety (or possibly a new species) of Trichius, and soon the four corners of my handkerchief were knotted over specimens of this beetle and the whole handkerchief was redolent of the strangely sweet—if pungent—scent the insect releases on capture—some of the tiger-beetles emit a similar volatile essence with the same sweet but searching odour.

I was about a mile from the Glen when I happened on the first new beetle banqueting in the Tea blossoms—not only a new species, but a new genus; its extremely attenuate outline could belong to nothing but *Strangalia*, and *Strangalia* it proved to be, *Strangalia luteicornis*. It was a happy entomologist, I can tell you, who fitted the stopper of his drinking-cup over that jejune little atomy, and a most unhappy entomologist who had to open the same a score of times and coax a new capture in before any of the inmates found an exit. Handling a basket of snakes, or driving a pig to market would be child's play to that problem. But though

I lost two or three of the entire bag, it was a great catch that I emptied out into my cyanide bottle as soon as I got home: three *Strangalia luteicornis*, four *Leptura subhamata* (all ♂), six *Leptura cordifera*, two *Leptura dehiscens*, and one *Toxotus cylindricollis*, besides not a few specimens of *Trichius*, *Typocerus* and *Leptura* that I had taken occasionally before.

Two days' sun-bath and about 30 hours of revelling among ferns, flowers and insects had made a new man of me, and now, as I lay down the pen with which I have tried to call out of the past the spirit of my trip, dipping deep in the ink-well of memory, it is my most ardent desire to repeat it all in the body next July, and following the lure of *Bellamira*, *Tylonotus*, or *Strangalia*, make one more rare new capture.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The 53rd Annual Meeting of the Society will be held at its headquarters in the Ontario Agricultural College, Guelph, on Thursday and Friday, November 2nd and 3rd, and will be presided over by Mr. Albert F. Winn, President (Westmount, P. Q.).

A popular lecture will be given on the Thursday evening in Massey Hall by Dr. L. O. Howard, Chief of the U. S. Bureau of Entomology, Washington, D. C.

It is hoped that the members of the Society will endeavour to be present. Subscribers to the "Canadian Entomologist" are cordially invited to attend and to present papers. Members and visitors will be entertained at luncheon in the College Dining Hall at the noon hour each day.

The Secretary will be greatly obliged if members and others will send him the titles of papers they wish to present (stating the length of time required for reading) as soon as they can, in order that the programme may be prepared in due time; it will also be a convenience if members and visitors will notify him a few days before the meeting of their intention to be present.

A. W. BAKER,
Secretary.

Ontario Agricultural College, Guelph.

SOME GENERIC GROUPS IN THE MALLOPHAGAN FAMILY MENOPONIDÆ.

BY G. F. FERRIS, STANFORD UNIVERSITY, CALIFORNIA.

The chief interest in the study of the Mallophaga lies in the problem of their distribution, which is beyond question fundamentally the problem of the relationships of their hosts. It has already been pointed out very clearly by Kellogg and Harrison that the solution of the first problem may legitimatelybe used as an aid in the solution of the second; that the student of these parasites may possibly be able to throw some light upon certain questions of the answers to which the ornithologists are at present in doubt.

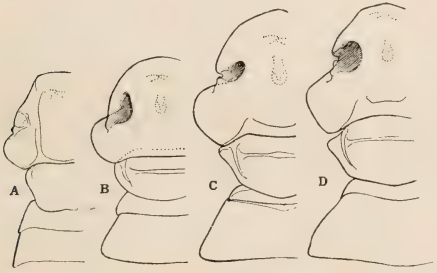

Fig. 10.—Outlines of one side of head of: A, *Dennyus distinctus*, n. s.p.; B, *Myrsidea diffusa* (Kell.); C, *Actornithophilus uniserialus* (P); D, *Heleonomus miandrius* (Kell.).

However, before this happy end can be achieved, it is necessary that the classification of the Mallophaga themselves be placed upon a sound basis, something that, as it is becoming increasingly apparent, has not yet been accomplished. The generic groups that have in the past been recognized are entirely too broad adequately to express the needs of the situation. The old genera are for the most part really of family value, and many of them have quite recently been elevated to this rank; but the division of these unwieldly and complex groups into small and compact genera has as yet hardly begun, nor have the limits of many of the groups been accurately defined. It is toward this end that this paper is a slight contribution.

The two relatively very large genera, *Colpocephalum* and *Menopon*, with a few smaller genera, constitute the family *Menoponidæ*, a family that includes nearly one-fifth of all the known

Mallophagan species. The family contains a considerable number of unrecognized generic groups, for the separation of which characters must be used that have heretofore been almost entirely neglected. Of these characters those to be found in the chætotaxy of the posterior femora are perhaps of first importance. The spines on the ventral face of these femora may be arranged in a series of "combs," which are always associated with similar combs upon certain abdominal sternites, or they may be arranged in a distinct patch or brush, usually associated with similar brushes on the abdomen, or they may be irregularly arranged or entirely lacking. The taxonomic value of the combs has already been pointed out by Harrison in the case of *Colpocephalum* (in its restricted sense) and *Tetrophthalmus*, but the brushes have apparently not, as yet, been noted in literature.

Of probably secondary importance are other characters, including the presence of either a slit or notch in front of the eye, the segmentation of the thorax, the presence of heavy spines on the ventral side of the head, the character of the chætotaxy of the abdomen, the genitalia of the males and the presence of peculiar structures in the gular region.

Having in mind these characters, the group which this paper considers may be defined as follows.

Menoponidæ with more or less distinct patches or brushes of spines upon the ventral face of the posterior femora and upon certain abdominal segments. Thorax three-segmented, usually distinctly so, although the mesothorax is sometimes much reduced. Head of a very characteristic shape, the temples very prominent, projecting well beyond the lateral margin.

The following key will serve to distinguish the included genera:

1. Head with a distinct notch (not a slit) in the lateral margin just before the eye.....2.

   Lateral margin of the head continuous to the eye.....3.

2. Femoral and sternal patches composed of spines which are distinctly smaller than those constituting the general chætotaxy and are very closely crowded together.
   Genus *Heleonomus*, n. gen.

Femoral and sternal patches small, composed of spines as large as those constituting the general chætotaxy, with which the ventral patches sometimes merge.
Genus *Actornithophilus*, n. gen.

3. Oesophageal sclerite and glands apparently lacking, second sternite never with asters of heavy spines.
Genus *Dennyus* Neumann.

Oesophageal sclerite and glands present, although sometimes quite small; second sternite generally with asters of heavy spines.
Genus *Myrsidea* Waterston.

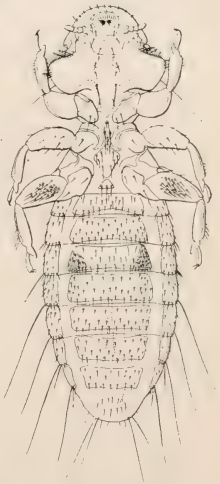

Fig. 11.—*Actornithophilus uniseriatus* (P), ventral side of male.

Genus **Actornithophilus,** n. gen.
Figs. 10c, 11, 13f.

Menoponidæ with small, rather indefinite patches of spines upon the ventral face of the posterior femora and upon certain abdominal sternites, the spines composing the patches as large as those constituting the general chætotaxy and sometimes merging with it. Thorax distinctly three-segmented, the mesothorax small, but clearly distinguishable. Head of a characteristic shape, the anterior margin rounded, the temples very prominent, their anterior margins nearly at right angles with the longitudinal axis of the body. Lateral margin with a distinct notch before the eye; this notch backed up by a small chitinous area. Oesophageal sclerite and glands present. Male genitalia apparently characteristic, consisting of a very long and slender basal plate, continuous distally with a lamina at the base of which the small paramera and slender endomera (?) are set.

Species occurring, at least for the most part, upon Charadriiformes (*Laridæ*, *Alcidæ*, *Charadriidæ*).

Type of the genus, *Colpocephalum uniseriatum* Piaget.

INCLUDED SPECIES.

From **Laridæ.**

Colpocephalum abbotti Kellogg.
Colpocephalum crassipes Piaget.
Colpocephalum epiphanes Kellogg and Chapman.
Colpocephalum funebre Kellogg.
Colpocephalum fuscipes Piaget.
Colpocephalum incisum Piaget.
Colpocephalum latifasciatum Piaget.
Colpocephalum maurum Nitzsch.
Colpocephalum milleri Kellogg and Kuwana.
(—*C. incisum* Piaget. ?)
Colpocephalum sulcatum Piaget.

From **Alcidæ.**

Colpocephalum perplanum Kellogg and Chapman.

From **Charadriidæ.**

Colpocephalum bicolor Piaget.
Colpocephalum cornutum Giebel.
Colpocephalum fumidum Kellogg.
Colpocephalum gracile Piaget.
Colpocephalum grandiceps Piaget.
Colpocephalum kilauensis Kellogg and Chapman.
Colpocephalum morsitans Kellogg.
Colpocephalum ochraceum Nitzsch.
Colpocephalum ocularis Carriker.
Colpocephalum pœtulum Kellogg and Kuwana.
Colpocephalum patellatum Piaget.
Colpocephalum pustulosum Piaget.
Colpocephalum spinulosum Piaget.
Colpocephalum stictum Kellogg and Paine.
Colpocephalum tigrum Kellogg and Paine.
Colpocephalum timidum Kellogg.
Colpocephalum umbrinum Piaget.
Colpocephalum uniforme Piaget.
Colpocephalum uniseriatum Piaget.

From **Passerine Hosts.**

Colpocephalum grandiculum Kellogg.

The genus thus formed is a very homogeneous group, and is apparently characteristic of the Charadriiformes (as that order is understood by the more recent authors), especially of the Laro-Limicolæ. A single species, *A. grandiculus* (Kel.) is recorded from Passerine hosts, but it is possible that these records are unnatural. Only those species of which it is possible to be practically certain have been referred to the genus, and doubtless others will later be included. The list as given probably contains some synonyms, but this cannot at present be definitely determined.

The figures illustrating the genus are of *A. uniseriatus* (P.), the genotype, and *A. timidus* (Kel.).

Fig. 12.—*Heleonomus miandrius* (Kell.), ventral side of male.

Genus **Heleonomus**, n. gen.
Figs. 10d, 12, 13e.

Menoponidæ with very distinct patches of spines upon the ventral face of the posterior femora and upon the 4th abdominal sternite, the spines composing the patches very numerous, closely crowded together and distinctly smaller than those constituting the general chætotaxy. Thorax 3-segmented, the meso-thorax small. Head of characteristic shape, the lateral margins slightly swollen above the bases of the antennæ, the temples prominent, reclined with the anterior margin set at a very sharp angle to the longitudinal axis of the body. Lateral margin of the head with a deep notch just before the eye, this notch backed up by a large chitinous area. Oesophageal sclerite and glands present. Male genitalia apparently quite characteristic, the basal plate extremely long and slender, the parameres large and stout, with the distal half curved sharply outward. A pair

of conspicuous, tubular chitinous structures present in connection with the preputial sack.

Occurring, at least for the most part, upon Gruiformes.

Type of the genus, *Colpocephalum truncatum* Piaget.

INCLUDED SPECIES.

From **Gruidæ**.

Colpocephalum abdominale Piaget.

Colpocephalum assimile Piaget.

Colpocephalum miandrium Kellogg.

Colpocephalum truncatum Piaget.

Heleonomus confusus n. sp.

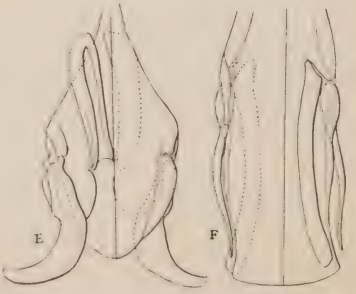

Fig. 13.—Genitalia, except basal plate of: E, *Heleonomus miandrius* (Kell.); F, *Actornithophilus tumidus* (Kell.).

This little genus differs rather markedly in general appearance from the preceding, but the tangible characters upon which the two may be separated are few. The shape of the head and the character of the patches of spines, with the character of the male genitalia, are, however, sufficient to afford grounds for their separation. The males of three of the species are before me, and the genitalia of these three are all of the same peculiar type, so it may be assumed that they are the same throughout the genus.

Superficially the genus very closely resembles another group (*Colpocephalum* sens. str.), which occurs upon the same hosts, but which is marked by the presence of combs of spines upon the posterior femora. For this reason it is unsafe to refer species to the new genus without knowledge of this character, which has been entirely overlooked in most descriptions. Only those species of which there can be no doubt (four of them are before me) have been referred to the new genus.

The figures are of *H. miandrius* (Kel.), an entirely typical member of the group.

Heleonomus confusus, n. sp.

Colpocephalum miandrium (in part) Kellogg, Rept. Kilimandjaro Exped., No. 15, pt. 4, p. 53 (1908).

This species has already been described as the female of *H. miandrius* (Kel.). One of the two specimens at hand is a male in which the genitalia are very weakly developed, this fact, and their presence upon the same host, having led to the confusion of this species and *H. miandrius*.

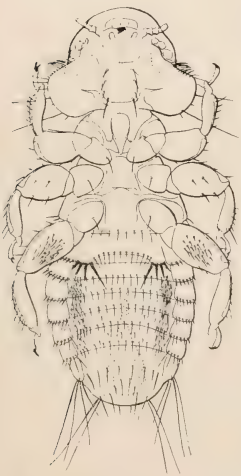

Fig. 14.—*Myrsidea diffusa* (Kell.), ventral side of male.

Host, *Balearica regulorum gibbericeps* (Africa).

Genus **Myrsidea** Waterston.

Figs. 10b, 14.

Myrsidea Waterston, Ent. Monthly Mag., Vol. 51, pp. 12-13. (1915).

Menoponidæ with indistinct patches of spines upon the ventral face of the posterior femora and certain abdominal sternites, those upon the sternites merging more or less with the general chætotaxy. Thorax distinctly 3-segmented, the metathorax frequently curiously modified and produced posteriorly. Head of characteristic shape, the forehead rounded, the temples very prominent and with the anterior margins nearly at right angles to the longitudinal axis of the body. Lateral margin of the head continuous with the eye. Oesophageal sclerite and glands present, although sometimes very small. Abdominal tergites of the female sometimes modified. Second abdominal sternite usually, but not always, with asters of heavy spines. Male genitalia of a type common to this genus and to *Dennyus*, the basal plate moderately long, continuous distally with a broad rounded lamina at the base of which the stout, apically recurved parameres are set.

Occurring for the most part upon Passeriformes, particularly the *Corvidæ*, but also occurring upon certain families of the *Coraciiformes*.

Type of the genus, *Myrsidea victrix* Waterston.

INCLUDED SPECIES.

Order PASSERIFORMES.

Family **Corvidæ.**

Menopon albiceps Piaget.
Menopon anathorax Nitzsch.
Menopon brunneum Piaget.
Menopon consimile Piaget.
Menopon eurysternum Nitzsch.
Menopon funereum Kellogg and Chapman.
Menopon indivisum Piaget.
Menopon insolitum Kellogg and Paine.
Menopon interruptus Osborn.
Menopon mesoleucum Nitzsch.
Menopon nigrum Kellogg and Paine.
Menopon obovatum Piaget.
Menopon ovatum Piaget.
Menopon robsoni Cummings.
Colpocephalum sjoestedti Kellogg.
Menopon trinoton Piaget.
Menopon trithorax Piaget.

Family **Fringillidæ.**

Menopon conspicuum Kellogg and Chapman.
Menopon incertum Kellogg.
Menopon melanorum Kellogg.

Family **Sturnidæ.**

Menopon cucullaris Piaget.
Menopon invadens Kellogg and Chapman.

Family **Drepanididæ.**

Menopon cyrtostigmum Kellogg and Chapman.

Family **Hirundinidæ.**

Menopon dissimile Kellogg.
Trinoton stramineum Giebel.

Family **Icteridæ.**

Colpocephalum mirabile Carriker.

Order Coraciiformes.

Family **Caprimulgidæ.**

Colpocephalum extraneum Carriker.

Family **Rhamphastidæ.**

Myrsidea victrix Waterston.

Family **Alcidinidæ.**

Nitzschia latifrons Carriker.

The genus was well characterized by Waterston, but, as it appears to be a member of the group under discussion, the description has been repeated, with certain modifications and additions, in order to emphasize the resemblances to and differences from these other genera. No list of included species has heretofore been published.

Many of the included species, especially those upon the *Corvidæ*, are in some respects among the most peculiar of all the Mallophaga, due to the curious modifications of the metathorax of the female. Waterston has suggested that the genus should be still further divided, those species not sexually dimorphic being placed in another genus. However, it hardly seems best to do this, for every degree of dimorphism appears, nor are the modifications of any constant type. Even the asters of heavy spines on the second sternite of the abdomen, which appear in almost all of the species are lacking in *M. sjoestedti*, in other respects one of the most typical members of the group. It would seem that there is throughout the genus an "inherent" tendency to vary, and any further division is liable to result in artificial groupings. The figures are of *M. diffusa* (Kel.), a typical species.

Genus **Dennyus** Neumann.

Figs. 10a, 15.

Nitzschia (not of Baer), Denny, Mon Anopl. Brit., p. 230 (1842).

Dennyus Neumann, Bull. Soc. Zool. France, Vol. 20, p. 60. (1906)

Menoponidæ with distinct patches of spines upon the ventral face of the posterior femora and upon the 8th and 6th abdominal sternites. Thorax distinctly 3-segmented, the prothorax very

narrow. Head of characteristic shape, the lateral margins continuous with the eye and slightly swollen above the base of the antennæ, the temples prominent. Oesophageal sclerite and glands apparently lacking. Anterior femora much flattened and expanded. Second abdominal sternite never with asters of spines. Genitalia of the male of the same type as in *Myrsidæ*.

Occurring, as far as known, only on Micropodidæ (Order Coraciiformes).

Type of the genus *Nitzschia burmeisteri* Denny.

The genus is in many respects very similar to some of the species of *Myrsidea* (*M. dissimile*, for instance), but the combination of characters given is sufficient to distinguish the two. There are less than a dozen species known, and some of these are apparently synonyms. *Dennyus dubius* (Kel.), which was described from immature specimens, is very likely a synonym of either *D. burmeisteri* or *D. tibialis*, but, in the absence of specimens of these two species, little can be done to settle the matter. *D. bruneri* (Car.) is almost certainly a synonym of *D. dubius*, as a cotype of the former which I have before me shows, and some of Carriker's other species appear doubtful. *Nitzschia latifrons* Carriker is almost certainly a *Myrsidea*.

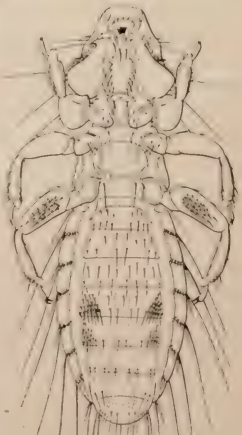

Fig. 15.—*Dennyus distinctus*, n. sp., ventral side of male.

Dennyus distinctus, n. sp.

Description of female—Length 2.2 mm., colour a uniform dark brown.

Head as long as wide, triangular in shape, except for the rather broadly truncate anterior margin, which distinguishes the species from all the others in the genus. Occipital bands distinct, extending forward to above the bases of the mandibles. Principal points of the chætotaxy as follows: A pair of slender hairs directly above the base of each mandible; a longer hair on the lateral

swelling slightly in from the margin; a single long hair and two or three shorter ones at the margin on the lateral swelling: a close fringe of short hairs on the anterior margin of the temples; a transverse row of four long hairs on the occiput between the occipital bands.

Prothorax nearly as long as wide, rather quadrate in shape, rounded posteriorly; two or three short spines and a hair on each "shoulder," and six short hairs along the posterior margin.

Mesothorax and *metathorax* nearly equal in length, separated by a distinct suture. Metathorax with a transverse row of long hairs on the posterior margin.

Legs of the type common to the genus, the anterior femora flattened and much expanded.

Abdomen elongated, with nearly parallel sides, widest across the fourth or fifth segment. Each segment with a single transverse row of hairs along the posterior margin, the hairs not as long as the succeeding segment. Second to ninth segments each with a single extremely long hair and one or two shorter hairs at each posterior lateral angle.

Pleurites distinct, separated from the sternites by a narrow clear area, the posterior margin of each pleurite bearing a row of five or six short, thorn-like spines. First sternite short, heavily chitinized, the posterior angles produced back over the second sternite. Remaining sternites less heavily chitinized, but quite distinct. Each sternite with a transverse row of four to eight short, slender hairs along the posterior margin, the second to fifth with a few other scattered hairs. Fifth and sixth each with a distinct patch of closely set spines in each posterior lateral angle.

Description of male—Length 1.9 mm. Very similar to the female, the abdomen somewhat more pointed. Genitalia of the type common to this genus and to *Myrsidea*.

Two males, a female and two immature forms from *Collocallia* sp. (Samarang, Java, E. Jacobson coll.).

A very distinct species, differing in the truncate anterior margin of the head from any other of the genus, but in other respects an entirely typical *Dennyus*. Types in the Stanford University collection.

CANADIAN SPECIES OF THE BEE GENUS *STELIS* PANZ.

BY F. W. L. SLADEN, OTTAWA.

(The figures before names refer to species in the Canadian National Collection.)

Females.

1. Skin colour black.....2.
   Skin colour bronzy.....6.
2. Pale spot behind eye and pale line on inner margin of eye, last ventral segment of abdomen wide and rounded, and projecting far beyond last dorsal segment, which is angulated; length 5 mm.
   subg.....*Stelidium* Robt., 1060, *ontariana*, n. sp.
   (?—*trypetinum* Robt.)
   Ottawa, 16, VIII.
   One specimen, J. I. Beaulne, 1912.
   No pale markings on head.....3.
3. Abdominal segments 1 and 2 or 1 to 3 or 4 with a small lateral spot, segments 4 and 5 often with two small inner spots, abdomen so closely punctured as to appear somewhat dull; length 5 mm.
   subg.....*Microstelis*, 1061 *lateralis* Cr.
   Ottawa, VII.
   Segments with pale bands, more or less interrupted; abdomen less closely punctured,
   subg.....*Chelynia* Prov. .4.
4. Last dorsal segment with longitudinal ridge on apical portion: last ventral segment tridentate beyond apex of dorsum, the middle tooth long and acuminate.....1062, *rubri* Ckll.
   Banff, Alta ; 25, VI
   Apex of abdomen without these structures.....5.
5. Abdomen elongate, pale bands all about equally interrupted in the middle, last ventral segment projects well beyond last dorsal segment, last dorsal segment with golden pubescence on margin, sting slender and pale 1063 *subemarginata* Cr.
   Abdomen rather broad, pale bands usually more widely interrupted on basal segments than on apical segments, last

ventral segment scarcely projects beyond last dorsal, last dorsal without golden pubescence underneath black hairs, sting stout, black.

.....1064 *fœderalis* Sm. (*nitida* Cr.)

Ont., Ottawa, 8, VI.

6. Segments 1 to 3 with complete yellow bands, segments 4 and 5 with narrow bands, some black hairs on vertex and pleura, length 6 mm.

(subg.....*Chelynia*), Ste. 1065.

Shawnigan, Vancouver Island, 8, VII.

No pale markings, head smaller, narrower than thorax, face much longer than broad, skin dark metallic blue-green, including legs; whole insect, including underside of abdomen, sparingly clothed with short black hair; margin of 6th dorsal segment reflexed.

.....*Pavostelis* (n. subg.) 1066 *montana* Cr.

Banff, Lethbridge, Alta., VI.

Males.

1. A pale spot above each eye and pale markings on inner margins of eye, surface of ventral segment without groove or ridge, four spots on segments 1 and 2, and two on 3 and 4; whole insect strongly punctured all over; length 4½ mm.

subg.....*Stelidium* Robt., 1055, *ontariana* Sla.

(?—*trypetinum* Robt.)

Bethesda, Ont., 15, VIII.

One specimen, Dr. Brodie, 1892.

Head without pale markings.....2.

2. Second recurrent nervure received at or beyond apex of second submarginal cell, 3rd ventral segment depressed in centre, generally a small pale spot on side of segments 1 and 2, often two small spots or a line on side of segments 3 and 4, segment 5 sometimes all black, abdomen so closely punctured as to be rather dull; length 3 to 4 mm.

subg.....*Microstelis* Anct. 3.

Second recurrent nervure usually received before the apex of second submarginal cell, abdomen with pale bands, often interrupted in centre,

subg.....*Chelynia* Prov. 4.

3. Wings normal.....1056 *lateralis* Cr.
Ottawa, 6, VI, on *Potentilla*, etc.
First recurrent nervure fails to reach submarginal nervure in either wings.....*maculatum* Proy.
4. Ventral segment 3 depressed in centre at apex; length 8 mm.
.....1057 (?*monticola* Cr.)
One specimen, Vernon, B. C. (Venables).
Ventral segment 3 raised in centre at apex, length less. 5.
5. Third ventral segment with low tubercle at apex in centre, the tubercle slightly produced beyond margin, bands on segments 1 to 5 all about equally interrupted in middle, second submarginal cell longer than first, abdomen much longer than broad; length 4 to 7 mm.....1058 *subemarginata* Cr.
N. B. to Man., Ottawa, 1, VI.
Third ventral segment broadly raised at apex in centre, not produced, pale skin bands on segments 1 to 5 more widely interrupted on basal segments than on apical segments; on segment 5 they usually meet, abdomen almost as broad as long.....1059 *fœderalis* Cr. (—*nitida* Cr.)
Ottawa, 6, VI, Toronto.

(In the compilation of the above tables the author is indebted for help to Mr. J. C. Crawford of Washington.)

A CURIOUS TRAP FOR DRAGONFLIES.

In a pasture just south of De Grassi Point, Lake Simcoe, Ont., there is an artesian well, consisting of an iron pipe driven perpendicularly into the ground to the required depth and projecting about $2\frac{1}{2}$ feet above the surface. It terminates in a curved joint, from which the water strikes the ground almost vertically, with sufficient force to drill a hole about 10 inches deep into the soil. The water then spreads into a shallow puddle, used as a watering place for cattle and geese. Some of it, however, passes under a nearby fence into a ditch dug along the edge of a cultivated field. This ditch, which is not more than about a foot wide, is the haunt of a number of dragonflies, some of which probably breed nowhere else in the vicinity of De Grassi Point. The water is for the most part covered with duckweed (*Lemna*).

and along the edges of the ditch cat-tail flags and many marsh plants grow.

While visiting this spot on August 9, 1916, I noticed a small dragonfly caught under the jet of water, and on looking closer I found no less than nine of these insects or their remains held down by the force of the cold stream. They were all at or near the surface, most of them more or less entangled in the mat of grass into which the water poured.

The following species were thus found: *Lestes unguiculatus* Hagen, 1♂, 1♀; *Lestes rectangularis* Say, 2♂, 1♀; *Lestes disjunctus* Selys, 1♂; *Libellula pulchella* Drury, 2♂, *Sympetrum* sp., fragments.

The *Lestes* were all alive and though somewhat benumbed were apparently none the worse for the cold shower. One of the Libellulas was alive but not very active, the other dead and broken.

On Aug. 12 I visited the spot and found *Lestes forcipatus* Rambur 1♂, 1♀, both alive; *Libellula pulchella*, dead; and some indeterminable fragments of *Lestes*.

No other insects besides dragonflies were found on either occasion. Other dragonflies which were found at this spot on these dates are the following:

Lestes uncatus Kirby.
Ischnura verticalis (Say).
Ischnura posita (Hagen).
Nehalennia irene (Hagen).
Æshna umbrosa E. M. Walker.
Æshna constricta Say.
Libellula quadrimaculata L.
Libellula lydia Drury.
Sympetrum obtrusum (Hagen).
Sympetrum semicinctum (Say).

The Libellulas were seen only about the puddle, where *L. pulchella* and *lydia* were common. The various species of Lestes were chiefly found along the ditch, but occurred also about the puddle; the other damsel-flies and *Sympetrum semicinctum* were found only along the ditch. *S. obtrusum* was generally distributed. The Æshnas were probably stray visitors.

E. M. Walker.

NEW NORTH AMERICAN SPECIES OF THE GENUS GONOMYIA Meigen.

(Tipulidæ, Diptera)

BY CHARLES P. ALEXANDER, ITHACA, N.Y.*

*Contribution from the Entomological Laboratory of Cornell University.

The species herewith described as new belong to the subgenus *Gonomyia*, the members of which have the cell R_2 of the wings present. As has been indicated in earlier papers it is almost impossible to identify isolated females in this genus and in most of the related Eriopterine genera, but the genitalia of the male sex offer remarkably clear-cut characters for the separation of closely related species.

Genus *Gonomyia* Meigen.

Gonomyia (Gonomyia) florens, sp.n.

Male—Length 4-4.1 mm.; wing 5.4-5.6 mm.

Female—Length 5.8 mm.; wing 6.8 mm.

Rostrum yellowish brown, the palpi dark brown. Antennæ long and slender, the scapal segments yellow, the first flagellar segment brown, yellowish at the base, remainder of the antennæ dark brown; flagellar segments rather elongated, slightly enlarged just beyond the base. Head yellow with a brown median line.

Mesonotal præscutum light yellow with three dark chestnut-brown stripes which are almost confluent behind; pseudosutural foveæ very large and prominent; lateral margin of the sclerite yellowish becoming more whitish beyond the pseudosutural foveæ; scutum with the lobes rich chestnut brown, the inner edge adjoining the median area yellow, the lateral margin yellowish; scutellum and postnotum light yellowish to a large extent. Pleura pale yellow with a dark brown stripe from the ventral portion of the cervical sclerites running back to the base of the abdomen, enclosing the base of the halteres; mesosternum pale brown; the pale pleural stripe with a sparse whitish bloom. Halteres light brown, the knob pale. Legs with the coxæ pale yellow; trochanters brown; femora light brownish yellow; tibiæ yellowish brown; tarsi brown. Wings with a strong yellowish tinge, the stigma indistinct, the costa yellow, remaining veins brown. Venation: *Sc* moderately long, ending just before or opposite the origin of *Rs*; *Rs* gently

curved; R_2 a little shorter than R_{2+3}; R_2 half again as long as the cross-vein *r-m*; outer deflection of M_3 obliterated so that cell 1st M_2 is confluent with cell M_3; basal deflection of Cu_1 at the fork of *M*.

Abdominal tergites brown, broadly margined with yellow; sternites yellow, the hypopygium concolorous. Hypopygium with the ninth tergite short, broad, the caudal margin transverse. Ninth pleurite very short and stout, the inner dorsal angle produced caudad into a blunt, fleshy lobe, whose inner margin is fringed with numerous long hairs; a short, blunt, fleshy knob at the base of this lobe, this knob provided with five long hairs on the margin; dorsal pleural appendage slender, originating just below the knob described above, directed proximad, the base enlarged with two or three stout hairs, the tip slightly bifid, the caudal arm with two bristles, the cephalic arm with one bristle; a stout bristle just before the tip on the inner or cephalic side; second pleural appendage a powerful chitinized hook, slightly curved, directed proximad, toward the apex bent strongly cephalad; ventral pleural appendage a slender fleshy rod, beyond the slightly enlarged base bent strongly dorsad so that it lies above the second appendage, at the tip directed caudad and here capped with a short, blunt, chitinized spine. Ninth sternite with a prominent median knob on the caudal margin, this knob with numerous setigerous tubercles.

Habitat—Eastern United States.

Holotype—♂, Indian Castle, Herkimer Co., N.Y., June 9, 1915, (Alexander).

Allotype—♀, topotypic.

Paratypes—3♂ ♀, topotypic.

The types are in the collection of the author.

G. florens may be distinguished from the closely related *G. cognatella* O. S. by its slightly larger size, brighter colouration, and the male genitalia (the powerful curved second appendage, the short, black apex to the ventral appendage, etc.).

Gonomyia (Gonomyia) flavibasis, sp. n.

Male—Length 5.2 mm.; wing 5.3 mm.

Rostrum and palpi dark brown. Antennæ with the two basal segments bright pale yellow; flagellar segments brown with a dense

pale pubescence that is most noticeable on the basal segments. Head yellow with a dark brown median mark.

Pronotum yellow, slightly darkened medially. Mesonotal prascutum yellow with three dark brown stripes, the lateral pair being almost confluent with the broad middle stripe; lateral stripes removed from the margin of the sclerite and beginning just back of the pseudosutural foveae; the latter is elongate rectangular, chestnut in colour; scutum yellow, the greater portion of each lobe brown; scutellum brown basally, the caudal half yellow; postnotum brown, the sides of the sclerite yellow. Pleura light yellow with two dark brown stripes as follows: dorsal stripe narrow, clear-cut, beginning on the cervical sclerites, running backward just above the base of the fore coxae and above the base of the halteres; the ventral stripe occupies the mesosternum and is of a much paler brown than the other stripe; the yellow stripe enclosed is very pale, suffused with whitish. Halteres pale, the knobs slightly infuscated. Legs with the coxae and trochanters light yellowish brown, the fore coxae whitish yellow on the outer face; femora, tibiae and tarsi very pale brown, the latter dark brown on the last three segments. Wings nearly hyaline, the stigma indistinct, the veins brown. Venation: *Sc* short, ending far before the origin of *Rs*, this distance about equal to vein R_2 alone; basal deflection of R_{1+2} very short or lacking; basal deflection of *Cu*1 beyond the fork of *M*, this distance a little shorter than the first deflection of M_{1+2}; cell *1st* M_2 open.

Abdominal tergites dark brown, the terminal segments slightly margined with yellowish; sternites light yellow. Hypopygium with the pleurites rather long and slender, the dorsal angle produced caudad as a flattened, fleshy lobe that bears many hairs on the dorsal face; appendages two, the first appendage very long, flattened, the apex bent, the surface of the arm with many long hairs; second appendage complex consisting of a chitinized hook that is slightly bent; underneath the base of this hook is a fleshy lobe with several short bristles on the outer face; above the base of the hook is a slender subchitinized rod that is darkened at the tip.

Habitat—Western United States.

Holotype—♂, Monterey Co., California; July 18, 1896.

Part of the W. M. Wheeler collection in the American Museum of Natural History.

This fly belongs to the *cognatella* group and is closest to *G. delicata* Alexander (Guatemala) but the venation is quite different in the longer subcosta, the different shape of the sector and other venational details.

Gonomyia (Gonomyia) noveboracensis, sp. n.

Male—Length 4 mm.; wing 4.9 mm.

Rostrum light yellowish brown, the palpi dark brown. Antennæ black throughout, the basal segments enlarged, the flagellar segments very short, tapering suddenly to the tip of the appendage. Head light gray.

Pronotal scutellum white, dark brown medially. Mesonotal prescutum plain grayish brown, the area behind the pseudosutural foveæ paler, more yellowish; scutum similar; scutellum brownish yellow; postnotum brown with a sparse grayish bloom. Pleura white with two brown stripes, the dorsal one beginning on the cervical sclerites and continuing back to the wing basis; the ventral stripe occupying the mesosternum. Halteres pale. Legs with the coxæ and trochanters brownish yellow; femora, tibiæ and tarsi uniform dark brown. Wings light gray, the stigma not indicated; costal vein yellow, the remaining veins dark brown. Venation: *Sc* short ending far before the origin of *Rs*, this distance sub-equal to the cross-vein *r-m*; *Rs* rather short, rather sharply bent just beyond the base, a little shorter than R_{2+3}; R_2 oblique, a little longer than the cross-vein *r-m*; basal deflection of Cu_1 at or just beyond the fork of *M*.

Abdominal tergites dark brown, broadly margined with silvery; sternites similar, narrowly ringed caudally with silvery; hypopygium reddish yellow. Hypopygium with the ninth tergite having the caudal margin with a broad rounded concavity. Ninth pleurite prominent, elongate, the dorsal inner edge with a prominent tubercle that bears several hairs, the ventral inner edge with a row of large setigerous tubercles; three small pleural appendages, a small, inner, dorsal, cylindrical appendage directed cephalad, slightly enlarged basally, at the apex bearing three or four prominent hairs; a dorsal apical appendage directed proximad, flattened,

enlarged at the apex which bears a row of delicate hairs; a slender subchitinized ventral apical appendage that is directed proximad, slightly toothed at the tip and on the lower side just before the tip. Gonapophyses and the penis-guard fused into a very large, prominent, cylindrical tube that is armed with chitinized horns and fleshy lobes; the dorsal surface of the tube with two subpendulous, fleshy lobes that are approximated along the median line and densely provided with short, pale hairs; the horns of the cylinder are directed caudad and slightly ventrad; the outermost horns are very broad at the base tapering to the acute apices which are curved proximad; the next inner pair of horns slender, chitinized, bifid at the apex; innermost pair of horns slender, slightly twisted, narrowed to the apex. Ninth sternite with a broad V-shaped median notch, the adjacent angles produced caudo-laterad as fleshy lobes that are provided with numerous setigerous punctures.

Habitat—Eastern United States.

Holotype—♂, Sacandaga Park, Fulton Co., New York; June 11, 1914, (Alexander).

Paratype—♂, topotypic.

The types are in the collection of the author.

Gonomyia (Gonomyia) filicauda, sp. n.

Male—Length 4.8-5.2 mm.; wing 6.3-6.4 mm.

Female—Length 5.4 mm.; wing 6.6 mm.

Rostrum and palpi dark brown, the last palpal segment slender, equal to the preceding two together. Antennæ dark brownish black throughout, the flagellar segments elongate-oval with an abundant pale pubescence and a few stout, black hairs. Head blackish with a dark gray bloom, slightly paler around the occiput.

Pronotum pinkish, the median line broadly dark brown. Mesonotal præscutum dark grayish brown without apparent stripes; sides of the præscutum, median area of the scutum, posterior half of the scutellum and sides of the postnotum light yellow. Pleura light yellow with large dark brown areas representing two interrupted stripes, as follows: on the proepisternum, mesepisternum, mesosternum, a narrow area just in front of the base of the halteres, the anterior face of the fore coxæ and the lateral

face of the posterior coxæ. Halteres very long and slender, pale. Legs with the coxæ yellow marked with brown as described above; trochanters brownish yellow; femora brown, slightly paler at the extreme base; tibiæ and tarsi dark brown. Wings with a strong grayish brown tinge; stigma pale brown; veins dark brown; venation: *Sc* rather long, ending slightly beyond the origin of *Rs*; *Rs* very long, longer than R_{2+3}; basal deflection of R_{4+5} very short or lacking; *r-m* very long, arcuated.

Abdominal tergites dark brown, the extreme lateral margins and the parts of the hypopygium largely yellowish; sternites light brown, the caudal margin very broadly ringed with yellow. Hypopygium with the pleurites moderately long, the dorsal angle produced caudad and slightly dorsad as an elongated fleshy lobe that is sparsely hairy, the hairs on the outer face strong, those on the inner face weak; dorsal pleural appendage a short, fleshy lobe whose caudal margin is produced into a powerful, curved, heavily chitinized hook, directed inward and dorsad; at the tip of the fleshy portion of the lobe are two stout hairs and a group of about eight smaller ones: ventral pleural appendage very long, slender, beyond the base slightly expanded, the apical portion slender, slightly expanded toward the tip, dusky in colour and provided with an abundance of long, delicate hairs. Penis-guard pale in colour, simple, slender from an enlarged base, the apex split by a deep, rounded notch.

Habitat—Rocky Mountain Region.

Holotype—♂, Webster, Colorado, near Platte Cañon; August 24-26, 1915; altitude 9,500 feet (E. J. Oslar).

Allotype—♀, topotypic.

Paratypes—30 ♂♀, topotypic.

The types are in the collection of the author.

Belongs to the *subcinerea* group; a long-winged, dark-winged fly with exceedingly elongate halteres. In some specimens the pale colour on the sides of the mesonotal præscutum is obscured by the gray-brown of the dorsum.

Gonomyia (Gonomyia) mexicana, sp.n.

Male—Length 6.1 mm.; wing 6.8 mm.

Female—Length 7 mm.

Similar in colour to *Gonomyia unicolor* Alexander (Guatemala) but larger, the mesonotum more grayish, pseudosutural foveæ and tuberculate pits black, conspicuous, and the venational details slightly different.

Antennæ uniformly dark brown throughout. Pronotal scutellum light yellow. Mesonotal præscutum grayish brown, shiny, without apparent stripes; a rather light yellow area before the pseudosutural foveæ; a dull yellow area between this foveæ and the transverse suture and a small yellow spot on the sides of the scutal lobes above the wing-root. Wing-venation: R_{2+3} twice the length of R_2 and much longer than R_s; *r-m* nearly as long as the basal deflection of Cu_1, the latter inserted at from one-quarter to one-third the length of cell *1st* M_2. Male hypopygium with the ninth tergite rather short, the caudal margin straight or nearly so; ninth pleurite elongate, rather stout, the dorsal pleural appendage rather short, cylindrical, fleshy, the cephalic or inner angle of the apex with two strong, powerful bristles, the caudal or outer angle with two smaller hairs; second pleural appendage strongly chitinized, the tip acute, curved; ventral pleural appendage a long, pale lobe, subcylindrical, blunt at the apex and bearing sparse elongate hairs; penis-guard very long and pale, the apex bifid by a deep U-shaped notch, each of the lobes thus formed with long hairs; on the ventral face of this arises a slender, rod-like median appendage, sparsely short-hairy at the apex and down the ventral face; the divergent subtending arms are slender, somewhat flattened, the apices produced into a slender cylindrical point, the outer or ventral margin with a few sharp, appressed teeth.

Habitat—Mexico.

Holotype—♂. Cordoba, Mexico; May 8, 1908 (Frederick Knab).

The type is in the United States National Museum.

This species was earlier determined as being *Gonomyia unicolor*, variety, (Proceedings of the United States National Museum, vol. 44, p. 507, 1913); the differences between these closely allied forms will be indicated in connection with the next species, *Gonomyia æqualis*, n.

Gonomyia (Gonomyia) æqualis, sp.n.

Male—Length 6.1 mm.; wing 6.6 mm.

In all general features quite similar to *Gonomyia mexicana*, the main differences lying in the genitalia of the male, these being as follows: Ninth tergite almost straight across or slightly concave; ninth pleurite moderately stout, the dorsal angle produced caudad as a very slender, finger-like lobe, which is provided with numerous setigerous tubercles; at the base of this lobe on the inner side is a tiny, fleshy protuberence directed proximad; dorsal pleural appendage irregular, fleshy, directed proximad, the caudal or outer face near the apex with a strong, curved, chitinized hook, which is directed dorsad and cephalad, the cephalic or inner face with a row of strong bristles which are longer and more approximated at the tip; ventral pleural appendage a pale, fleshy lobe densely covered with short, pale hairs; penis-guard rather long, compressed, the median appendage pale, slightly curved; anal tube broad, prominent, subtended on either side by a concave wing that bears on the caudal outer angle a fimbriate tuft of yellow bristles.

Habitat—Guatemala.

Holotype—♂, Totonicopan, Guatemala; July, 1902; (G. Eisen).

Allotype—♀, topotypic.

The types are in the United States National Museum. This species was earlier determined as being a variety of *Gonomyia unicolor* (Proceedings of the United States National Museum, vol. 44, p. 507, 1913), but is readily separated from both *unicolor* and *mexicana* by the structure of the male genitalia. In *G. unicolor* the hypopygium may be described as follows: Ninth tergite almost straight across or slightly concave; ninth pleurite moderately stout, elongated, the dorsal angle not produced; dorsal pleural appendage a subcylindrical, fleshy lobe from an enlarged base, at the apex, with two powerful bristles, the cephalic or inner face with four small hairs that are evenly spaced; ventral pleural appendage a double lobe, dark-coloured, subchitinized, the inner arm stout, cylindrical, with the tip acute, the inner side with two or three hairs, the outer or more ventral arm is slender, curved, and bears

near the tip two stout divergent hairs; penis-guard seen from beneath, a powerful, quadrangular, chitinized base whose caudal angle is a ventrally directed hook, the base on either side subtended by short gonapophyses that end in sharp, chitinized, conical spines; from above and dorsal of the quadrangular base arise two divergent, cylindrical, pointed, chitinized arms.

Gonomyia (Gonomyia) californica, sp.n.

Male—Length 7 mm.; wing 6 mm.

Female—Length 7-9 mm.; wing 6.6 mm.

Rostrum and palpi dark brown. Antennæ with the first segment dull yellow above, the flagellum dark brown. Head bright, pale yellow passing into brown on the sides of the occiput and vertex; a narrow, dark brown median vitta.

Pronotum pale with two divergent brown lines that are connected at the anterior end. Mesonotal præscutum dull yellow with three dark brown stripes that are confluent, only the areas about the pseudosutural foveæ and backward along the margin of the sclerite being of the ground colour; scutum light brown, the lobes dark brown, a dull yellow spot on the lateral margin above the wing-root; scutellum mostly brown, margined caudally with yellow; postnotum dark brown, the basal portions yellowish. Pleura light yellow with two dark brown bands, the dorsal one beginning on the propleura and including a small spot at the base of the fore coxa, continuing backward as a broad band that surrounds the base of the halteres and becomes confluent with the brown of the mesonotal præscutum; the ventral band begins behind the fore coxa, occupies the mesosternum and includes the base of the middle and hind coxæ. Halteres pale, the knob brown. Legs with the coxæ as described above; trochanters pale yellow; femora dull yellow with a dark brown anteapical annulus; remainder of the legs broken. Wings subhyaline, the costal veins yellowish, the remaining veins brown; dark brown spots on the wing-disk as follows: at the humeral cross-vein; at the arculus; at the origin of *Rs*; at the tip of Sc_1; along the basal deflection of Cu_1; at the basal deflection of R_{4+5}; cross-vein *m*; a large stigmal area; at the fork R_{2+3}; at the tips of cells R_3 and R_5,

and a faint seam along the cross-vein *r-m*; venation: *Sc* long, extending beyond mid-length of the long sector; R_1 and R_2 scarcely contiguous at the wing-margin; basal deflection of Cu_1 before the fork of *M*; basal deflection of M_3 absent.

Abdominal tergites dark brown, the caudal and lateral margins dull yellow; segment eight largely yellow except the extreme base which is brown; segment nine yellow with a narrow basal ring with a slight median projection caudad; sternites dark brown, deepest sublaterally, the caudal and lateral margins dull yellow. Hypopygium having the ninth tergite with a deep, narrow median notch, the lateral angles rounded. Ninth pleurite stout, the outer angle produced caudad into a slender fleshy lobe that is pointed at the apex and sparsely provided with setigerous tubercles; dorsal pleural appendage a triangular fleshy lobe that is provided with long coarse hairs; ventral pleural appendage, a two-armed chitinized rod whose outer ventral arm is stout basally, narrowed toward the apex which is again expanded into a blunt tip; the inner arm bends dorsad, slender, tapering into an acute blackened apex. Penis-guard prominent, the sides subparallel, the apical half on the dorsal surface with numerous hairs, the apex produced ventro-caudad into a prominent median lobule.

Habitat—Western America.

Holotype—♂, Blue Lake, Humboldt Co., California; June 20-27, 1907 (J. Chester Bradley).

Allotype—♀, topotypic.

Paratypes—1♂, 1♀, topotypic; 1♀, Peachland, British Columbia, May 19, 1912; 1 ♀, topotypic, June 24, 1903.

The type is in the collection of Cornell University, paratypes in the collection of the author. The two last-named paratypes were earlier determined as *G. blanda* O. S. (Proceed. Acad. Nat. Sci. Phila., October, 1914, p. 286, 287).

This interesting species is nearest to *G. blanda* O. S. differing in the striped pleura, the long subcosta with a dark blotch at its tip, the slight amount of dark colour in the apices of cells R_3 and R_5, and in conspicuous details of the male hypopygium.

GEOMETRID NOTES.

New Species and Varieties.

BY L. W. SWETT, WEST SOMERVILLE, MASS.

Macaria fieldi, n. sp.

Male—Expanse 20-23 mm. Head, antennæ and legs light ashen gray. Thorax and abdomen light ashen gray, with a slight pinkish cast. Fore wings light ashen gray intradiscally, becoming fuscous beyond. They are clear ashen gray to the basal line, which is broad and strongly black at the inner margin, running at a slight angle to the median vein, where it seems to fade out, and there is just a trace of an orange line to the costa. The mesial space is also clear ashen gray, sometimes with a pinkish cast in fresh specimens. Discal spot black, with a paler centre, forming a ringlet of considerable size. The extradiscal line appears as a spot on the costa, just below which it is apparently broken off, running out sharply at a right angle, then connecting with a heavy black line, which runs almost straight to the inner margin, curving in slightly from M_3 to the margin. The black extradiscal line has a faint orange line bordering it inwardly, appearing stronger when the black is faded out. Beyond the extradiscal line there is an irregular blackish or fuscous clouding, apparently bordered by an irregular whitish line. Beyond this clouding the margin of the wing is slightly paler, and there appears to be a minute black dot at the base of the fringe on each vein. Fringe on all the wings fuscous. Hind wings basally light ashen, darker at outer border, more or less strigated. There is a prominent black discal spot; beyond this an extradiscal line, which runs straight across the wing, sometimes fading out before reaching the outer margin. Beyond this is a faint whitish line, appearing like a continuation of that of the fore wing, though not apparent in all specimens. Beneath, very pale ashen, the lines above showing through. The fuscous clouding appears on both fore and hind wings, not quite reaching the outer margins. The discal spots are prominent and black on all the wings.

Female paler than the male, the black extra- and intradiscal lines very faint, with an orange shading, sometimes appearing as pale orange-coloured lines. Fuscous clouding less heavy. Beneath,

the female is more strigated and there is a tendency for the shading to form a more distinct extradiscal band than in the male. On the hind wing, however, the clouding never forms a band to the margin of the wing.

This species bears a slight resemblance to *snoviata* Packard and *puertata* Grossbeck, but differs from both in the straight extradiscal line on both fore and hind wings and in the marginal band beneath.

I take pleasure in naming this species after Mr. George H. Field, who has done so much to advance our knowledge of California Lepidoptera.

Holotype—♂, La Puerta Valley, Calif., July 11; in my collection at the Museum of Comparative Zoology, Cambridge, Mass.; received through the kindness of Mr. Field.

Allotype—♀, La Puerta Valley, Calif., July 11, in Mr. Field's collection at San Diego, Calif.

Paratypes—♂'s and ♀'s, from same locality, in Mr. Field's collection and my own.

Macaria grossbecki, n. sp.

Male—Expanse 22-23 mm. Head, antennæ and legs fawn-coloured. Thorax and abdomen brownish ashen, darker than in *fieldi*, with a suffused appearance, without conspicuous lines or markings as in the other species. Intradiscal line faint, pale orange, shaded with black; mesial space heavily strigated, as in the entire wing; not paler, as in *fieldi*. Discal ringlet clear black, with paler centre. Extradiscal line faint, blackish, with slight clouding. Veins with faint minute dots, fringe fuscous. Hind wings of the same colour as fore wings, with a trace of an irregular extradiscal ochreous line, blackish-shaded. Beneath paler than above, the discal ringlets showing on all the wings. No markings apparent, except the extradiscal brown marginal band, which shades to the outer margin; in this respect differing from *fieldi*.

Female—Similar above to the male; beneath much lighter basally, where it is strigated, a brownish band running extradiscally solidly to the outer margin.

Viewed from beneath, this species has somewhat the appearance of *puertata* Grossbeck; but above, it appears very different

on account of the lack of any heavy markings. It is possibly a suffused variety of *puertata*, but the markings above seem to indicate a distinct and apparently rare species.

I take pleasure in naming this form in memory of Mr. John Grossbeck, whom I considered our best authority on the Geometridæ, and who, shortly before his death, wrote me that he was taking up the mixed *Macaria-Sciagraphia* group. Unfortunately he was never able to finish this work, having only commenced to assemble the material at the time of his decease.

Holotype—♂, La Puerta Valley, Calif., July 11 (G. Field); also in my collection.

Allotype—♀, La Puerta Valley, Calif., July 11 (G. Field); in my collection.

Paratypes—Both sexes, from same locality, all taken by Mr. Field; in his collection and mine.

Macaria minuta (Hulst).

Another species, which I was intending to describe, I came across labelled by Mr. Grossbeck as *Diastictis minuta* Hulst. If this identification is correct, as I believe it to be, the species is not a *Diastictis*, but a *Macaria*.

Above, it has a slight resemblance to *M. grossbecki*: but below, the extradiscal shading forms a bright ochre band, which is not solid, and extends only half way to the outer margin.

I have a very pale female, labelled by Mr. Grossbeck, in error, "*Sciagraphia heliothidata?*" Evidently it puzzled him. I think the strong fuscous marginal shading above and the light ochre below will serve to distinguish this obscure species. Hulst was doubtless puzzled through having only females. There are four brown spots on the costa, from which run pale, irregular, orange, black-shaded lines.

Macaria puertata Grossbeck is one of the most easily recognized species, and should be readily known by the characters of the underside, as should all these closely-related species.

My specimens of *M. minuta* are from La Puerta Valley, Calif., July 11, and Prescott, Ariz., Aug. 13, collected by Messrs. Geo. H. Field and E. J. Oslar

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POPULAR AND PRACTICAL ENTOMOLOGY.

From the Editor's Office Chair.

BY R. P. DOW, EDITOR OF THE BULLETIN OF THE BROOKLYN ENTOMOLOGICAL SOCIETY.

Practically every periodical devoted to insect study (and there have been more than fifty such in North America) is the organ of some scientific society, and its mission is to bring to that society the credit of making permanent record of discoveries of lasting scientific value. No entomological magazine has been more than barely self-supporting, and few that much. The magazine is necessarily "dry" reading, its papers for the most part severely technical. The dyed-in-the-wool bug man rather resents popular articles dealing in generalities. The paper most esteemed is one making description of new species. Such is of value for reference so long as Science endures, but how many wish to read a minute description of the external anatomy of some insect he has never seen? Only the few specialists in that particular group. I do not believe that the average subscriber to our entomological journals finds an average of more than two interesting papers out of the dozen in an average number. The Lepidopterist does not care for a paper on *Thrips*, and so on.

It is the editor who has to read all papers. If he be "on the job" he takes down boxes of specimens and proves the correctness of every detail of synopses submitted to him. If he can understand, it follows that a specialist will have no difficulty. The editor reads painstakingly, glossary in hand. The casual reader gives two minutes, where he gives hours.

And yet every editor, while on the one hand trying to do his duty by strict Science (no matter how dry), makes his best effort

that the magazine be readable by the greatest possible number of subscribers. He tries to balance his subjects, so that there are no superabundance dealing with any one order. Most amateurs are interested in the Lepidoptera, but papers on this order containing new material are very scarce. The greatest number of students are collecters of the Coleoptera, but it takes a year to prepare a synoptic table of beetles which the reader disposes of in ten minutes. The additions to the sum total of human knowledge are more in the lesser known orders, Diptera, Hymenoptera and the minor ones. Of all these there are few amateurs to read. So, in the effort to please as many as possible, one succeeds in pleasing almost no one.

On this particular editor's desk there have lain letters from well over a thousand entomologists or collectors of insects. Less than one per cent. contain praise of some article. Fifteen per cent. come from professional entomologists, most of them demurring against further subscription. The leading authority on grasshoppers does not subscribe, because the few grasshopper papers are sent to him anyway by the friendly authors, and he does not wish to burden his bookshelves with matter concerning crickets or roaches. The economic entomologists are too intent on their own useful observation of some pest to read anything whatever, much less identify a species. They send to Washington to have that done. Eighty per cent. of the letters on the editor's desk are from amateurs. There are many of them, if only there was a way to reach and talk with them. In 1823 a list of butterfly collectors in Great Britain contained 18,000 names. Here in North America a popular, rather expensive, highly illustrated butterfly book has reached a sale of something like 90,000 copies. A few per cent. of these readers have come in contact with some entomological magazine. The burden of their speech is pretty much the same throughout. The Canadian Entomologist, the Brooklyn Bulletin, and all the rest, are too far above their heads, too technical, too hard to understand, containing too little to help them identify the species they have caught.

One cannot read without having learned the alphabet. How many of our collectors have more than a single book to teach

them the fundamental principles? In a magazine of few pages there is no room for repetition of the rudiments. We ourselves cannot comprehend how any one can be willing to stick a pin through an insect without possessing a short shelf of books to tell what it is, why it is, how its life is passed, what are its relationships. The writer recalls perfectly his own first entomological experiences. A little girl in frail health had been taught by an older brother to collect and try to study. To help her the writer took the net and pursued butterfly and dragonfly. The first evening came the first earnest perusal of the first book. It was Comstock's Manual. It gave the order and the family, and had wood-cuts illustrating typical forms. At each chapter there was a delightful essay by Anna Botsford Comstock in general terms that a child could understand. Long before there had come to hand books by a Brooklyn artist who used to love his daily walk behind the Flatbush waterworks, where the watershed was so protected that Nature found her free sway. Wm. Hamilton Gibson wrote most of his papers for Harper's Magazine, but all were subsequently reprinted in quarto book form with the hundreds of illustrations from thumb-nail sketch to full page plate. Most of these are probably out of print years ago, but every copy found in second-hand bookshop should be bought and treasured. The late Henry G. McCook many years ago wrote a duodecimo called "The Tenants of an Abandoned Farm." The wood-cuts were rough but they had their charm, telling of spiders, ants, and a host of others. A few years ago a new edition appeared, with some changes and a different title. All these preach the sermon of the infinite beauty of the great All Out Doors.

Every stranger who in the last two years has wandered into a meeting of the New York or the Brooklyn Entomological Society has been influenced thither by some book. Chief among them have been the volumes of the late J. H. Fabre, a Frenchman, now almost all translated into English. This wonderful man, overlooked by the world almost to the hour of his death in extreme old age, found and studied the infinities of animate creation in his own back yard. In a forty foot square countless creatures are born, married and died (just like humans). How much more did this impoverished Apostle of Nature accomplish than some

other enthusiast who searched the uttermost corner of the globe for some rarity of which he could know nothing except a scientific name applied by some subsequent taxonomist. Every human being conscious that God gave him eyes with which to see may well start his bookshelf with some volume of Fabre.

Sir John Lubbock kept for many years a little nest of ants between two sheets of glass until he learned to distinguish each individual by sight. His works, although severely scientific, read easily as fiction. Get, then, your library, your two-foot shelf of priceless books. Little by little pass from primer to second and third readers. A few good books are designed for young people, but are fully as interesting to grown-ups. Such a one is Beard's American Boys' Book of Bugs, Butterflies and Beetles. It can easily develop the collecting habit. Then comes a booklet published by the American Museum of Natural History in New York, How to Collect and Preserve Insects. It costs but ten cents. The work of almost every country collector is rendered almost valueless for scientific purposes by ignorance of simple methods of care.

To any one progressing thus far some text book on Entomology becomes a necessity. On the editor's table stand four such, each having some distinctive interest, although covering the same theme, —Guide to the Study of Insects by the late Asa Packard of Brown University, of which there have been many editions; Economic Entomology, by the late John B. Smith, of Rutgers College; Manual for the Study of Insects, by J. H. Comstock, of Cornell University; and Entomology with Reference to its Biological and Economic Aspects, by J. W. Folsom, of the University of Illinois,—Blakinson. There can be no choice between these four leading text books. All are most readable. *Chacun à son goût.* Differing very slightly, perhaps a little less comprehensive, but with more detail in spots is American Insects, by Vernon C. Kellogg, of the University of California. Of the Cambridge Natural History, volumes V and VI treat of Insects, by Dr. Sedgwick and Dr. David Sharp. In this the specific examples given are British or world-wide.

To fill even a two-foot shelf possibly next consideration should

be given to the economic aspect. Three cover much the same ground, all finding favour on the editor's table, for the independent illustrations glorify all of them:—Manual of Fruit Insects, Slingerland and Crosby, of Cornell; Insect Pests of Farm, Garden and Orchard, by D. Sanderson; and Agricultural Entomology by Herbert Osborn, of the University of Ohio. The New York State Museum issued two quarto volumes on Insects Affecting Park and Woodland Trees, by E. P. Felt, State Entomologist, with a wonderful wealth of illustration chiefly of beetles, by L. J. Joutel, but this monumental work may be now a little hard to procure.

Next on the shelf of working library comes works on particular groups. Most of these are somewhat expensive, for colour plates cost much to publish. Wright's Butterflies of the Pacific Coast is the best and most complete for its territory. The American Museum of Natural History booklet, Our Common Butterflies, is perfectly workable and costs only fifteen cents. The standard work on Butterflies of North America is by W. J. Holland. Its colour plates will serve for identification of species, except in the "skippers" and some of the more obscurely marked Nymphalidæ. The collector of Hesperiidæ must consult some specialist in the family or leading Museum to be sure of correctness.

The Moth Book, by W. J. Holland, is equally well illustrated and serves for final identification of all large or showy forms. The "millers" are represented by about half the number of distinctly known species (the whole being too voluminous) and from the book a perfectly good general knowledge can be gained. For exact identification, however, one must look farther. There are whole groups of Noctuid moths, scientific knowledge of which is still woefully incomplete. No good book exists on the thousands of species of the Microlepidoptera, of which probably one-half are not yet known to Science. A synonymical catalogue of all known American Lepidoptera was prepared by H. G. Dyar and staff of specialists, known as Bulletin 52 of the U. S. National Museum, but this wonderful work was treated as are most of the Government publications, sent to an army of legislators who cared nothing for them, and within a few months "out of print"

for the entomological students to whom the volume is of priceless value.

An "Insect Book," by L. O. Howard, U. S. Government Entomologist, with full quota of coloured plates, was published to include all orders except Lepidoptera and beetles. It is no reflection upon Dr. Howard to say that this work is unsatisfactory, since it had to be made uniform with others for the publishers, and so had to cover in the single volume a field requiring at least ten volumes to be essential to even a four-foot book shelf of working library of a Nature lover. However, it is well worth owning. As it covers a field in which many hundred thousand species exist, it is not a guide to identification even to the genera.

Uniform is the Spider Book, by J. H. Comstock, combining exact science and popular readability. Its illustrations are equal to the others of the series, and it serves well for identifications of species. A number of spider books by J. H. Emerton have mostly wood cuts, but well made, and with clearly written text. They are inexpensive. A work of highest scholarship and popular interest is the Ant Book, by Wm. Morton Wheeler. No work on the subject compares with it for completeness or offer of correct identifications. On the Diptera (the true flies) there is one good book, by S. A. Williston. In this enormous field final identifications are impracticable. A Catalogue of Described Diptera, by J. M. Aldrich, was a Smithsonian publication, remarkable for its accuracy in a little known field, but it suffered the same fate as Dyar's catalogue of Lepidoptera and second-hand copies command a large price.

There is no good work on the Hemiptera, or true bugs. The manuals of entomology give good chapters. An excellent check-list of the Hemiptera, by E. P. Van Duzee, has just been published by the New York Entomological Society, but, of course, a list does not contain facilities for identifying species. A definitive and popular work on the Hymenoptera is also impracticable since they are not easily pictured, and since the number of species is enormous, a large fraction of the smaller parasitic forms not yet being known.

Thus far there has been no mention of beetles, although that

order is the prime favorite among collectors. There are about 20,000 recognized forms in North America. To illustrate even a quarter of them in colour is a task that no publisher would risk. So many are monocolorous that exact drawings of structural characters would be needed in addition. The insects range in size from two inches to one-fiftieth of an inch. It has remained for the indefatigable W. S. Blatchley, formerly State Geologist of Indiana, to write the only practical work in the country,—The Beetles of Indiana. While it is confined to actual records from the State it is a fairly good workable list for all the country north of Florida and east of the Mississippi. It does not include the weevils, but a book is shortly to be published by Leng and Blatchley to cover this group of the Eastern United States and Canada. Identification of beetles must depend on the highly technical original descriptions and comparison with proved specimens. Even the checklist of them, Henshaw's Checklist of the Coleoptera, has been out of print for six years, and a successor volume is painfully slow in coming. American beetle study is at least fifty years behind Europe. The great work on classification by Leconte and Horn was published in 1883 and went out of print, *à la* Government publications generally, soon afterwards. It is too highly technical to be read without a glossary and deep pre-acquired knowledge of the subject.

Perhaps in the list of general works there might be included the Glossary of Terms used in Entomology, by John B. Smith, but this volume, while necessary to every advanced student or worker, is not really needed by those who wish to read (even exhaustively) the list of popular works quoted above.

Out of this list of about twenty volumes recommended as of prime importance or interest, one can get a splendid education by the possession of two, leaving the rest to be acquired at leisure, if at all. One must be a general Manual of Entomology, the other some volume devoted to the special field of one's choosing. Moreover no books can be more fascinating than these to any one who has love for the great All Out Doors. The more you have, the more you read diligently, the more enjoyment life shall have for you.

THE OCCURRENCE OF THE GENUS *ACHRYSOCHARELLOIDEA* GIRAULT IN NORTH AMERICA.

BY A. A. GIRAULT, GLENNDALE, MD.

This omphaline genus is characterized by the two grooves on the scutellum and the 4-jointed club. As regards the latter, there is uncertainty in the following new species; for the distinct terminal spine of the club, although "jointed" or constricted at about its middle, is not articulated, and the club must, therefore, be called 3-jointed with a terminal spine. This throws doubt on the genotype as regards this character. Its description should be verified. I had no opportunity to re-examine the type. The genus structurally is very similar to *Gyrolasella* of the Elachertini, but the body is metallic and the postmarginal vein is slightly longer than the stigmal but not nearly half the length of the marginal. Besides, its habitus is that of *Chrysocharis;* resembling also *Diaulinopsis*. Marginal vein a little shorter than the submarginal or subequal to it.

Achrysocharelloidea albiscapus, new species.

Female.—Length 0.75 mm.

Aeneous green, the fore wings lightly dusky throughout. Scape white, the legs golden yellow except the coxæ. Scaly-reticulated, the scutellum more finely so, the postscutellum and propodeum subglabrous, the latter with weakly indicated median and "lateral" carinæ ("lateral carinæ" just laterad of the small spiracle). Pedicel intermediate between the funicle joints in length, 1 a little longer than wide, 2 quadrate; club somewhat longer than the funicle, its joints no longer than the funicle joints. Mandibles 4-dentate. Marginal cilia of fore wing somewhat longer than usual (not extremely short, not a seventh of the greatest wing width). Stigmal vein with a distinct neck. Parapsidal furrows distinct, nearly or quite complete. Caudal wings with about seven lines of discal cilia where widest, their longest marginal cilia distinctly longer than those cilia of the fore wing. Pubescence very sparse. Caudal tibial spur single, small.

Described from one female taken in the woods at Hillmead (Glenndale), Maryland, Prince George County, April, 1916.

Type.—Catalogue *No. 20298*, U. S. N. M., the female on a slide.

DESCRIPTIONS OF AND OBSERVATIONS ON SOME CHALCIDOID HYMENOPTERA—II.

BY A. A. GIRAULT, GLENNDALE, MD.

Eurytoma pachyneuron, new species.

Female—Length 1.16 mm

Agrees with the type of *crassineura* Ashmead except as follows: The legs are reddish brown except most of the caudal tibia dorsad and a spot on the caudal coxa, also most of the middle tibia and the caudal femur more or less centrally above; the marginal vein is somewhat longer; funicle 1 is much slenderer and longer, over thrice longer than wide at apex (in *crassineura* only over twice longer than wide); funicle 2 is twice longer than wide (only a third longer than wide in the other species); the size is smaller; the median channel of the propodeum is single (double and wider in the other, no median basin in either). Tegulæ, ventral edge and proximal half of scape, reddish yellow. Umbilicately punctate. Petiole short. Abdomen polished above.

Described from one female reared in connection with *Isosoma*, Glendale, California (T. D. Urbahns).

Type—Catalogue *No. 20321*, U. S. N. M., the above female on a tag, the wings, caudal legs and antennæ on a slide with an antenna of type *crassineura* female.

A second female from Halliday, Utah (C. W. Creel) but differing in having the sides of the median channel very finely punctate, the sculpture finer than in the types and the legs entirely reddish yellow.

Xanthosoma nigricornis Ashmead. Genotype.

This is merely an *Eurytoma* with a fine sculpture.

Eurytomocharis minuta Ashmead. Genotype.

Marginal, postmarginal and stigmal veins *subequal*, the stigmal long. Club *solid*. Funicle 1 a little longer than wide, 2 globular, 3–5 each a little wider than long. Caudal tibial spurs double. Otherwise as in *Eurytoma*. Generic characters are the *solid* club and not otherwise. Type examined.

Decatomidea cooki Howard.

This is a varicoloured species of *Eurytoma* and is characterized (besides colours) by bearing a rounded, densely, finely punctate

median basin without a median channel through it. Type examined.

Eurytomocharis eragrostidis Howard.

Congeneric with *minuta* but the venation as in typical *Eurytoma;* marginal vein a third longer than the stigmal, the latter somewhat shorter than the postmarginal. A varicoloured species. Funicle 1 one-third longer than wide, wider distad, 2 quadrate. Type examined.

Eurytomocharis triodii Howard.

A species of *Eurytoma*. Venation as in *E. eragrostidis*. Funicle joints subequal, each about two-thirds longer than wide, subequal to club 1. Abdomen lanceolate, its petiole very short. Propodeal basin finely, densely punctate and with a flat bifoveate median channel through; elsewhere, propodeum coarsely foveate. Type examined.

Eurytoma minnesota, new species.

Female—Differs from *illinoisensis* in having the median channel of the propodeum double for nearly the proximal half, the former is somewhat more slender and the abdominal petiole is longer, approaching quadrate. The species *solenozopheriæ* Ashmead has the abdominal petiole very short, the abdomen subsessile and the median channel of the propodeum is bifoveate at base only. The three species are very close. The species *solenozopheriæ*, however, has the median basin of propodeum distinct caudad, there bounded by a V-shaped carina. Petiole finely scaly, tricarinate.

The male has the cephalic tibiæ more or less black; funicle 5-jointed.

Described from two males, six females reared from quack, Olmsted, Minnesota (C. N. Ainslie).

Types—Catalogue *No. 20322*, U. S. N. M., the above specimens, minutien-mounted.

Bruchophagus borealis Ashmead. Genotype.

The postmarginal vein is slightly longer than the stigmal, the latter than the marginal. Antennæ as in *Eurytoma*, the club 2-jointed. Caudal tibial spurs double. Segment 2 of abdomen subequal to 4, longest, 5 a fourth shorter. Petiole much wider than long. Propodeum with a nonchanneled, large, concave

median basin which is finely, densely punctate. Otherwise as in *Eurytoma*. From the female type. The species *funebris* Howard differs in coloration but not much otherwise. In *mexicanus*, the marginal vein is distinctly longer than the short stigmal, but the abdominal segments remain about the same as in the genotype; the venation varies somewhat and *mexicanus* should be compared with *funebris* which it closely resembles. However, the scape is reddish at base and the legs differ a little in colour. Types examined.

The male funicle is 4-jointed and this fact with the *shape* of the abdomen are the true generic differentials.

Systolodes brevicornis Ashmead. Genotype.

The female type is missing, but some males (so identified by Ashmead) I am unable to separate from the males of *Bruchophagus funebris* Howard and must conclude that the two are the same.

Specimens of *funebris* were found in the U. S. N. M. collections under the generic label, but they were from Washington, D. C. In the original description of *brevicornis*, Ashmead himself states that the two species are much alike. All other specimens placed under this genus by Ashmead were *funebris* or closely allied to it; none had the fourth abdominal segment greatly enlarged unless subjectively to some astigmatic observers). The genus *Systolodes* is a subjective abstraction!

Eurytoma binotata Ashmead.

The name of this Japanese species is preoccupied. The new name *nippon* is substituted for it.

Rileya americana, new species.

Female—Length 2.75 mm.

Robust and resembling a large specimen of *Eurytoma*, the abdomen compressed as in the genus. Pronotum longer than the scutum.

Black, the wings hyaline, the venation brown, the legs (except coxæ), scape and tegulæ reddish yellow, the tarsi, knees and tips of tibiæ whitish; abdomen dark reddish except dorsad and the petiole. Flagellum dark brown. Like *cecidomyiæ* Ashmead but thrice larger, segment 4 of the abdomen is not nearly half the length of 5 as in that species, 3 is much curved circularly, not

transverse, 2 is a round, disk-like plate, the petiole is very short, subobsolete, while the coarse, isolated rugæ on the propodeum are entirely different. Differs from *piercei* in the colour of the legs, the venation is longer in *americana*, the size much greater, propodeum different and so on. Scutellum with a rimmed apex and an obtuse cross-ridge before the apex. Segment 5 of abdomen occupying over half the surface, the abdomen densely scaly except segments 2 3. Propodeum with a pair of coarse, median rugæ which are a little separated at base and parallel there for a short distance (joined by a cross-ruga a short distance out), then widely diverging to run disto-laterad (straight) then abruptly looped up toward the spiracle forming a large semicircle; from the point of change to this loop, a straight, short ruga runs to the apex at the side of the neck (and between the two, one on each side, of these, are about three straight rugæ; a V-shaped ruga runs cephalad from the apex of the loops). Propodeum densely scaly, punctate. Femora darker, reddish toward base. Club 3-jointed; funicle 1 somewhat longer than wide, 2, quadrate; ring-joint 1, quadrate, the others wider. Pedicel slightly longer than funicle 1.

Described from three females in the collection of the U. S. National Museum labelled "5140°. 9–7–91". U. S.

Types—Catalogue *No. 20323*, U. S. N. M., the above specimens on tags and a slide bearing a caudal leg, a fore wing and an antenna.

Rileya hegeli, new species.

Female—Length 1.00 mm.

Golden yellow, the wings hyaline, the venation yellow, the following black markings: Pedicel above at base, distal half of scape above, flagellum (brown), scutum (except lateral margins except distad), pronotum distad across meson for a width equal to the black of the scutum, upper centre of occiput, apex of ovipositor, scutellum except lateral and distal margins and the meson of the abdomen broadly from base to beyond middle of segment 5. Postmarginal vein nearly as long as the marginal, over twice the length of the stigmal. Abdomen as in *cecidomyiæ* but segment 4 transverse-linear, 5 occupying three-fourths of the surface, the petiole very short. Propodeum with a cross-carina between which run longitudinal rugæ from base and from apex. Ring-joints

all cross-linear, 3 widest; funicle 1, quadrate, 5 a little wider than long; pedicel as long as funicle 1. Pronotum shorter than the scutum.

From one female in the U. S. National Museum from Biscayne Bay, Florida (Ashmead).

Type—Catalogue *No. 20324*, U. S. N. M., the female on a tag, a fore wing, caudal leg and an antenna on a slide.

Microdontomerus anthonomi Crawford.

Lutesville, Mo., (G. W. Barber). Antennæ 13-jointed with one ring-joint; funicle joints subequal but 7 somewhat wider, each about twice wider than long, shorter than the pedicel. The median carina on the propodeum may be doubled or trebled. In three females from the above locality, it was single, double and treble. The propodeum is more or less glabrous along the meson; it was tricarinate at the meson with one of the type females. Fore femur compressed.

Asympiesiella india, new species.

Female—Agrees with the description of the genotype except that only the caudal coxa is metallic at its proximal half, the scape is brownish black except along the ventral margin, the propodeum is scaly, funicle 1 is only a third longer than 4 which is twice longer than wide, the mandibles are 7-dentate; and the male differs in having the caudal coxa (except at apex), the distal half of the caudal femur and the same of the caudal tibia, black; its scape is pale except at apex, the white on the abdomen is confined to the meson; and funicle 4 is not quite twice the length of the club, the latter subequal to funicles 3 and 5. Rami on funicles 1-3, from the base of each, same side.

Head and thorax in both sexes scaly punctate.

Described from two pairs of each sex reared from *Gracillaria soyella*, the Tar Leaf-folder, Pusa, Behar, India, (T. B. Fletcher).

Types—Catalogue *No. 20325*, U. S. N. M., the specimens on four slides with a female antenna of *Sympiesis dolichogaster* Ashmead.

This Indian species differs from the North American *Sympiesis dolichogaster* Ashmead most notably in having the median carina of the propodeum but half complete and the scape less coloured. The species are congeneric. The validity of *Asympiesiella* must

be left for later treatment. The genotype is shaped like *dolichogaster* and the generic differential may hinge on the greatly elongated abdomen, if the club of *Sympiesis* is not truly 3-jointed and the males do not differ generically. It will do no harm for the present to let them stand but if there is no *true* and *real* difference but only an arbitrary and dermal one, the two must be combined. Here are Australian, North American and Indian species which, superficially, are identical.

Pleurotropis longus, new species.

Female—Length 2.75 mm.

Characterized by the long abdomen which is depressed and conical, distinctly longer than the head and thorax combined; like *perdubius* but the abdomen is more slender and somewhat longer, its segment 2 is glabrous and somewhat longer, the tibiæ are black to tips, funicle 1 is more slender, thrice longer than wide, 2, twice longer than wide. Otherwise the same.

Described from one female reared in connection with *Isosoma*, Lafayette, Indiana, (W. J. Phillips).

Types—Catalogue *No. 20326*, U. S. N. M., the specimen on a tag, antennæ and a pair of wings on a slide.

Aphidencyrtus inquisitor (Howard).

Many females from *Myzus persicæ* on peppers, Norfolk, Virginia, (D. E. Fink), October, 1915.

Asaphes americana Girault.

Norfolk, Virginia, September 3, 1915, from *Aphis rumicis* (D. E. Fink). The caudal coxæ may be suffused with yellowish.

Ormyrus unimaculatipennis, new species.

Note—In *Ormyrus* the parapsidal furrows are *distinct*, that is, easily seen but they are delicate, not deep. It is an error to say there are no parapsides. However, these furrows are sometimes subobsolete.

Female—Length 2.85 mm.

Dark metallic green, the scape (except a little at apex above) and legs (except the coxæ), reddish brown, the caudal tibiæ black, the tarsi white. Fore wings hyaline but with a large, distinct, rectangular (a little longer than wide) fuscous spot under a little less than the distal half of the marginal vein and which touches the apex of the stigmal and extends to the middle of the wing;

postmarginal vein somewhat longer than the nonsessile, curved, stigmal vein. Pedicel twice longer than wide at apex, nearly twice longer than funicle 1, the latter a very little longer than wide, longest yet subequal to 2; 6, twice wider than long; club with the joints (or two divisions) subobsolete. Second ring-joint larger than the first. Head and thorax finely cross-lined, the lines on the thorax not raised. Axillæ, scutellum laterad and the propodeum longitudinally lined, the thorax dorsad (except the propodeum between the spiracles) with prostrate, long pubescence from scattered minute punctures. Propodeum with a pair of widely separated median carinæ. Abdomen glabrous at immediate base, roughly scaly elsewhere; line 1 of large punctures double mesad, base of segment 3; 2, base of segment; 4, double; 3, base of segment; 4, inclined to be triple in places; no others; a median carina from base of segment 3 to middle of 5; segments 3–5 with a scalloped cross-ruga at about middle. Like the Australian species. The basal of the two lines of punctures on abdominal segments is at first of half-punctures but these become more complete distad, complete in line 3

From one female on a tag in the U. S. National Museum from Louisiana (C. F. Baker).

Type—Catalogue *No. 20327*, U. S. N. M., the foredescribed specimen and a slide bearing a fore wing and an antenna.

Habrolepoidea depressa, new species.

Female—Length 1.15 mm.

Body depressed, the ovipositor a little extruded yet distinctly so. Dark metallic purple, the wings hyaline, the legs coloured as in *Aphidencyrtus aphidiphagus* (Ashmead) from which this species differs as follows: The mandibles have the third tooth small, subacute (bidentate but the broad second tooth is rather deeply concaved at apex), the frons is moderately broad, the form depressed, the marginal vein is subequal to the stigmal and postmarginal veins. Venation black. Body very finely, microscopically scaly, shining, the axillæ glabrous. Pedicel subelongate, much longer than any funicle joint; funicle joints subquadrate but enlarging distad. Club wider than the funicle and three-fourths its length, obliquely truncate from base of joint 3. Scape with a distinct ventral exfoliation but this is not greatly convexed.

In the male, the band on the middle tibia reaches to the middle, the scape has a distinct convex ventral exfoliation, the pedicel is globular, the marginal vein shorter. The funicle is clothed with rather long, soft hairs, 1 twice longer than wide, 6 somewhat longer than wide; club solid, ovate, somewhat longer than funicle 1, hairy.

Described from two males, three females, reared from the eggs of *Cyllene robiniæ*, Morristown, Illinois, December 8, 1914, (J. R. Malloch).

Types—Catalogue *No. 20328*, U. S. N. M., the above specimens on tags, a head and fore wing of each sex on a slide.

The species is like a *Zoweneyrtus* except the shorter club in that genus. It may represent a new group. *Aphidencyrtus* Ashmead may be retained as a group distinct from *Habrolepoidea* only on the ground of a difference in mandibular shape.

Syrpophagus quadrimaculatæ Ashmead.

A synonym of *mesogrăptæ*. Types compared.

Habrolepoidea tarsalis, new species.

Female—Length 1.10 mm.

Like *depressa* but differing as follows: The scape is cylindrical, slender, the vertex not thin (cephalo-caudad), the form is narrower (moderate in width), the thorax convex, the postmarginal vein somewhat shorter than the stigmal, the scutellum finely longitudinally lined, the abdomen shorter, its ovipositor not extruded. Like *aphidiphagus* Ashmead but the mandibles with the third tooth acute, the scutellum with very fine longitudinal striation (instead of fine scaliness) and the venation is different. Funicle 1 a little longer than wide, 2 a half longer than wide, longest, 6 as long as 1 but wider. Club two-thirds or more the length of the funicle.

Described from two females in the collection of the U. S. National Museum, labelled "*Encyrtus tarsalis* Ashmead. Type. Indiana." The species does not seem to have been described before.

Type—Catalogue *No. 20329*, U. S. N. M., the above females on tags, a head and fore wing on a slide.

REMARKS ON *LYGUS INVITUS* SAY, WITH DESCRIPTIONS OF A NEW SPECIES AND VARIETY OF *LYGUS*. (HEMIPTERA MIRIDÆ).

BY HARRY H. KNIGHT, ITHACA, N. Y.*

The writer has spent considerable time during the past three seasons making observations on the life history and food plants of many species of *Miridæ* and particularly in the genus *Lygus*. The writer is also concluding work on a monograph of the genus *Lygus*, but for the benefit of certain economic workers interested in the forms here considered this small contribution is published in advance.

In the past *Lygus invitus* Say has been the name generally applied to the members of a small group of species, which on careful study based upon distinctive structures furnished by the male genital claspers, are readily and consistently separated. Thomas Say described *invitus* in 1831 and in his usual style this early worker brought out certain characters that will distinguish the species from all others. After a careful study of some forty species of *Lygus*, I wish to point out a distinctive combination of characters mentioned by Say and not exhibited by any other form thus far brought to my attention. The following is taken from the original description: "*C. invitus*—Dark livid or blackish; beneath green with a blackish lateral vitta." "Head . . . with an impressed longitudinal line . . . scutel with a pale, obsolete vitta, beyond the middle . . . beneath green, with a broad lateral black vitta."

After careful search for food plants I find that *invitus* breeds only on the elm, preferring always the young, thrifty plants with succulent shoots. The nymphs are pale greenish, hatching soon after the leaves come out in the spring from eggs that were inserted in the twigs the previous July. One can scarcely distinguish the nymphs from those of the species described below and which is well known as a pest on the pear. The nymphs are, however, smaller and more slender than those of the false

* Contribution from the Department of Entomology of Cornell University.
October, 1916

tarnished plant-bug. In a previous article, (Jour. Ec. Ent., vol. 8, p. 296, 1915) the writer described the manner of oviposition of the false tarnished plant-bug which is the same insect as *communis* described below, while the reference to this species breeding on elm refers to the true *invitus* of Say.

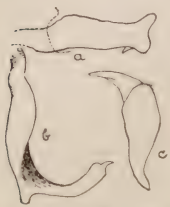

Fig. 16. *Lygus invitus* say, male genital claspers; *a* lateral aspect of the sinistral forceps; *b* sinistral forceps dissected, dorsal aspect; *c*, dextral forceps dissected, ventral aspect.

The male claspers of *invitus* show a close similarity to those of *communis*, but the practiced worker will note certain constant differences, and which are exhibited in the drawings (figs. 16, 17). The absence of a spine on the inner curve of the dextral forcep of *invitus* will distinguish this species at once from *communis*.

Lygus communis n. sp. Easily distinguished from *invitus* by the two black rays on the disk of the pronotum and by reddish in the lateral stripe on the body. Differs structurally in not having the impressed longitudinal line on the vertex and in the form of the male claspers.

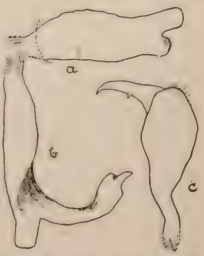

Fig. 17. *Lygus communis*, male genital claspers; *a*, lateral aspect of sinistral forceps; *b*, sinistral forceps dissected, dorsal aspect; *c*, dextral forceps dissected ventral aspect.

Male—Length 5.5 mm. *Head:* width across the eyes, 36*; width between eyes, 15; length (lateral measurement) 14; height at base, 22; yellowish brown or greenish marked with reddish; basal half of the tylus, arched portions of the juga, loræ, and bucculæ marked with reddish, also the front frequently marked with red in the form of transverse lines; apical half of the tylus dark brownish to fuscous; vertex full, without an impressed longitudinal line as in *invitus*, but having a slight triangular, flattened space just before the carina; eyes dark brownish, sometimes faded to pale on the

* Measurements for the head, antennæ and pronotum are given in micrometer readings which for comparison are more useful than figures given in millimeters. To reduce these measurements to millimeters multiply by .0285.

margins. Rostrum reaching to near the posterior margin of the hind coxæ, yellowish to brownish, the apex blackish.

Antennæ: segment I, length 20, greenish, frequently darkened with brownish; segment II, length 70, dark brownish to fuscous, sometimes basal half paler; segment III, length 42, dark brownish; segment IV, length 38, same colour as the preceding; all the segments with very fine, pale yellowish pubescence.

Pronotum: length 33, width at base 62, apex 32, width of collar 24; greenish, darkened with brownish on the basal half, two blackish rays on the disk, one behind each callus, in the darkest specimens extending across the calli, widening behind and nearly reaching the basal margin; coxal cleft marked with reddish, sides just posterior to this much darkened; disk shining, very finely and closely punctured, the punctures more or less transversely confluent especially on the basal half. Scutellum greenish darkened with brownish, transversely rugose; specimens maturing on *Ilex* and *Cornus* frequently have a longitudinal median fuscous line. Sternum pale beneath with the sides reddish as are the lateral parts of the meso- and metathorax.

Hemelytra: greatest width 2.3 mm., closely and minutely punctured, with fine yellowish pubescence; dark brownish to fuscous, darker on the apical half of the corium and across the tip of the embolium; embolium except the tip, the base and narrow lateral margin of the corium, pale greenish; cuneus clear, tinged with yellow, the very tip sometimes slightly darkened; membrane darkened with fuscous veins and narrow margin at the apex of the cells and bordering the cuneus, a spot along the margin beyond the apex of the cuneus and extending inward to the cells, clear, thus isolating a fuscous spot along the margin close to the apex of the cuneus.

Legs: coxæ pale, usually with a spot of reddish at the base, femora greenish to yellowish, the posterior femora and often the intermediate pair twice annulated near the apex with reddish, frequently the whole apical half quite reddish; tibiæ greenish, sometimes slightly darkened toward the tip, spines pale brownish, tarsi yellowish to brownish, darker at the apex.

Venter: pale greenish beneath, a broad lateral band and the genital segment, dark reddish with brownish. The male claspers

are distinctive for the species (fig. 17). The spine shown on the dextral forcep is not present in *invitus*, and is usually visible in pinned specimens without dissection.

Female—Slightly broader and more robust than the male, does not differ materially in coloration though usually paler than the male.

This is the species commonly known as the false tarnished plant-bug, and is a destructive species to the cultivated pear. For an account of the life history see Parrott and Hodgkiss 1913*. The species is found most commonly breeding on *Cornus*, particularly *C. stolonifera* and *C. paniculata*. I have also reared specimens from *Cornus alternifolia* and *Ilex verticillata*, and taken general specimens on the prickly ash (*Zanthoxylum americanum*).

The type specimens were collected by the writer on pear near Batavia, N. Y., July 4, 1914.

Paratypes: 67 specimens taken on pear, June 16 to Aug. 8, Batavia; 35 specimens from *Cornus stolonifera*, June 14 to Aug 6, Batavia; from *Cornus paniculata*, 5 specimens June 21, 10 specimens Aug. 1, 6 specimens Aug. 10, Batavia. From *Cornus alternifolia*, 16 specimens, June 25 to 29, Batavia; 3 specimens, June 25, Wyoming, N. Y.; 8 specimens, June 21, Portage, N. Y.; 3 specimens, July 27, McLean, N. Y.; from *Ilex verticillata*, 15 specimens, June 21, Batavia, N. Y. Miscellaneous specimens: 16 from near Batavia, N. Y., June 25 to 29; 7 specimens, June 27, Portage, N. Y.; 5 specimens, July 5, Four Mile, N. Y.; 2 specimens, June 13, and 3 specimens, July 24, Ithaca, N. Y.; 3 specimens, June 23, Conesus Lake, N. Y., all collected by the writer. Specimens from other collectors: ♀, June 25, Spring Brook, N. Y.; ♂, July 2, Hamburg, N. Y.; ♂ ♀, July 20, Salamanca, N. Y.; ♂, June 30, Bretton Woods, N. H., collected by Mr. E. P. Van Duzee; 2 ♂♂ June 22, Bennington, Vt.; ♂ ♀ July 15, Eastport, Me.; ♀, July 12, Capens, Me.; 2 ♂♂, July 15-24, Glen House, N. H., collected by Mr. C. W. Johnson. Male specimen from Fort Collins, Colo., Aug. 1, with an unusual amount of reddish on the body beneath.

* The False Tarnished Plant-bug as a Pear Pest, New York Agr. Expt. Sta. Bull. 368.

Lygus communis var. **novascotiensis** n. var. Paler and more slender than the typical *communis* but not differing materially in the male claspers. Breeds abundantly on apple in Nova Scotia; but in New York I have been unable to take any form of *communis* on the apple.

Length 5.3 mm., greatest width 2 mm., more slender and much paler than the typical *communis;* the two black rays on the pronotum small but distinct; hemelytra more yellowish brown than fuscous; lateral stripe of the body reddish or darkened with fuscous.

This is one of the varieties or races of *communis* which may be worked out from the forms inhabiting different plants, and perhaps influenced somewhat by different external conditions.

Described from several specimens received from Mr. Wm. H. Brittain, of Truro, Nova Scotia, collected from apple at Kentville, Wolfville, and Smith's Cove, Nova Scotia, July 6 to 28, 1915.

GEOMETRID NOTES.

On the Genus Xanthorhöe Hüb. (Petrophora Hüb.).

BY L. W. SWETT, WEST SOMERVILLE, MASS.

The names *Xanthorhöe* Hüb. and *Petrophora* Hüb. have been used interchangeably, but *Petrophora* Hüb. ("Tentamen," 1805) has priority over *Xanthorhöe* Hub. (Verz. bek. Schmett., 1816). The majority of European specialists are dropping the use of the "Tentamen" as they regard it more or less in the nature of a circular letter of doubtful date and place. Those who care to go farther into the matter should consult the excellent work of L. B. Prout and C. D. Sherborn (Annals and Magazine of Natural History, ser. 8, vol. IX, Jan., 1912); also Scudder (Proc. Am. Acad. Sci., vol. X, pp. 91-293, 1875), C. H. Fernald (Amherst, Mass., 16 pp., 1905), and Sherborn and Durant (Ann. Mag. Nat. Hist., ser. 7, Vol. II, pp. 491-495, Dec., 1898.)

The first species I propose to consider is *defensaria* Guen. (Spec. Gen.,vol. X, p. 411, 1857; also Packard, Monograph, p. 149, 1876). This species was described from a male taken in California. Guenèe says "near *munitata* Hüb. and especially *convallaria*, but more obscure," etc. The form that agrees most closely with this description—and I have examined some 400

specimens, including those of my own collection, that of Mr. E. H. Blackmore, the Museum of Comparative Zoology, Cambridge, Mass., and the American Museum of Natural History, New York—is the male with a dark, greyish outer border on the fore wings and a rather indistinct, brownish median band, beyond which are rows of triple dots on the veins, with traces of wavy lines. The female differs from the male in that the band is of a solid, dark, reddish-chocolate colour, the outer border is dark fuscous gray, and the hind wings are darker basally and have several undulating lines but not so many as the fore wings. When these wavy lines are rubbed they show only as points on the veins, and it was doubtless a rubbed specimen that formed the basis of Guenée's description. Both the male and the female belong to what I term the normal summer form, occurring from July 3 to August 30, according to my series.

Xanthorhoë defensaria in all its forms can be separated from *convallaria* in that the basal line of the latter has a very strong, regular, outward curve, where in *defensaria* it runs almost straight, in a more or less shaded line, to the inner margin. They average between 20 and 25 mm. in expanse in my series, only one or two measuring below 20 mm. and about the same number over 25 mm., but none above 27 mm.

I think this typical, normal, summer form with the gray outer margin can be readily recognized by this description. I have specimens of it from British Columbia and California. This typical form represents the second brood, there being an early spring brood which I shall discuss later. There are several varietal forms of the summer brood. Packard (Proc. Boston Soc. Nat. Hist., vol. XIII, p. 398, 1871) describes "*Xanthorhoë (Coremia) californiata*, one female, Edwards, from California" as new. In the material studied there is a specimen bearing this label and a small, round, punch label, "No. 1385." Beneath this on a large label is written "figured in Monog." in Packard's handwriting. This is undoubtedly Edwards' female, from California, and is not a variety of *munitata* Hüb., but of *defensaria* Guen. (See Packard's Monograph, p. 137, 1876). He evidently mixed *munitata* Hüb. and *defensaria* together, as he remarks on the peculiarities of the Labrador specimens. The specimen of *californiata* Pack.

(pl. VIII, fig. 67) which is in the Museum of Comparative Zoology, and undoubtedly represents the type, is the bright, red-banded form with gray outer margin to the fore wings. Hulst (Can. Ent., vol. XXXII, p. 104, 1900) described a very similar form as *Xanthorhöe* (*Hydriomena*) *amorata* from two specimens. Dr. Dyar (Proc. Ent. Soc. Wash., vol. VI, p. 223, 1904) refers *Hydriomena amorata* Hulst, male and female, to *defensaria* Guen. Mr. J. Grossbeck (Ent. News, pp. 147, April, 1907) states that there are two forms, probably both females, and although he refers both of these to *Xanthorhöe* (*Petrophora*) he retains the female with the bright, red, central band as the var. *amorata* Hulst, in view of the fact that it was so distinct. Evidently Dr. Dyar was in error when he said "male and female." In this var. *amorata* Hulst, the fore wings have a bright, red-brown, central band and a normal gray, outer border. I see no reason why the name *amorata* Hulst should not fall before the older name *californiata* Pack. I have compared one of Mr. Grossbeck's specimens with the type and, except that the central band is not quite so bright, they are identical. It is a matter of individual opinion as to whether *amorata* is worthy of being retained to designate an intermediate varietal form, or fall into the synonymy of *californiata* Pack. I am inclined towards the latter view.

The next variety of the summer form to be considered is the melanic or black-banded form, which I previously described as *mephistaria* Swett (Can. Ent., vol. XLVII, p. 157, May, 1915). There are a few errors here that I must have made in copying the dates, and should be corrected, as follows:—

Line 23, for *Jan. 9* read *July 9;* line 24, for *Feb. 3*, read *July 3*.

I doubt if any of these forms are ever found at such early dates as are thus erroneously given in this connection.

This black-banded form is the same in size as the typical form and is represented in both sexes, whereas I have seen the bright, red-banded form, *californiata* Pack., only in the female, though I see no reason why males should not be found. I believe this range of coloration from reddish chocolate through light red to black occurs in nearly all species of *Xanthorhöe*, e.g., *ferrugata* Clerc. and its black-banded var. *unidentaria* Haw.

Still another extreme form of the typical *defensaria* Gn. remains without a name, and I propose to describe it as follows:—

Xanthorhöe defensaria Gn., var. **conciliaria**, var. nov.

Expanse 23-25 mm. Wing pattern same as in normal *defensaria* Gn. except that the bands are a very deep reddish chocolate, the fore wings are basally yellowish and the outer margin is a reddish yellow or ochre. This yellow, suffused variety corresponds to the yellow variety of *munitata*, (*thethlandica* Prout). Doubtless this variation occurs in most of the Cidaria group allied to *munitata* Hüb. The white-banded spring form also shows this variation, but I think it does not differ sufficiently from *conciliaria* to receive a separate name. The dark-red, central band is lighter than normal and the wavy lines of the outer margin are present, but are reddish instead of fuscous.

This variety is very distinct. I have it only from Victoria, B. C., though no doubt it is common in Alaska. In some specimens the outer margin is entirely ochreous without markings except the marginal white line and two marginal white dots opposite the angle of the extradiscal line.

Holotype.—♂, Victoria, B. C., July 23, 1914, E. H. Blackmore; in my collection, received through the kindness of Mr. Blackmore.

Allotype.—♀, Victoria, B. C., Sept. 18, 1913, in collection of Mr. E. H. Blackmore.

Paratypes.—1♂ 6♀'s, Victoria, B. C., May, 14, 1914, to Aug. 26, 1914 and 1915, collection of Mr. Blackmore; also 5♀'s, Victoria, B. C., April 30 to Aug. 27, 1914 and 1915, Messrs. A. J. Croker and E. H. Blackmore, in coll. Swett.

There is a possible third brood which is found in the late fall up to October 1st. This is very small and stunted, and there is a tendency for the median band to be very narrow. The central band is of the same colour as in the normal male but is more solid and less distinct. This form is certainly worthy of a name and may be described as follows:—

Xanthorhöe defensaria Gn. var. **thanataria**, var. nov.

Expanse 18-20 mm. The bands are of the same shape as in the normal form but tend to be very narrow. Basally the male is pale ashen without lines, the central band dark and almost solid, in some specimens showing irregular lines. Outer margin very

pale ashen without lines, except the irregular scalloped marginal lines and black, twin spots. Hind wings somewhat semi-diaphanous, shaded with fuscous, with a pale extradiscal line basally. The females are of the same size and general appearance but the central band is lighter, being of about the same colour as in var. *californiata* Pack., sometimes with a yellowish tinge. Outer border light ashen, a little paler than the normal form, lines faintly discernible. I believe that a form corresponding to this is represented in the other allied Cidarias.

Holotype.—♂, Victoria, B. C., Aug. 1, 1915, E. H. Blackmore; in my collection, received through the kindness of Mr. Blackmore.

Allotype.—♀, Victoria, B C., Sept. 9, 1914; in collection of E. H. Blackmore.

Paratypes.—3 ♂'s 1 ♀, Victoria, B. C., Aug. 26 to Sept. 25, 1913 and 1914, in collection of E. H. Blackmore; also 1 ♂ 1 ♀ from same locality, Sept. 5 to 25, 1913 and 1914, in my collection.

This form is easily distinguished by its small size, lack of markings and narrow median band besides the other points enumerated.

Xanthorhöe defensaria Gn., var. **gigantaria**, var nov.

Under this name I propose to describe the typical early spring form, which may be easily recognized by its large size, heavy markings and wide bands.

Expanse 27-31 mm. The male has the general appearance of the male of the smaller summer form but differs in the following points:—Size much larger; median bands broader and heavier; basal line black or dark brown and very wide, in fact so wide that it generally merges with some part of the extradiscal line and gives somewhat the appearance of a more or less suffused median band. In the normal *defensaria* the basal band appears to start, as a rule, below the costa, but in the present variety it runs from costa to inner margin. The ♂ holotype has no lines on the outer border, merely a few black points on the veins. There is the usual irregular marginal white line, beyond which the outer margin is dark. In some of the other specimens, however, the outer border varies from the normal gray, with many wavy lines, to a slightly yellowish shade; but the latter is uncommon.

The female is as large and as striking as the male, the median

band is extremely wide and very dark and heavy. Between the basal band and the extradiscal the wing is so dark that only a broad, dark, intermediate band can be discerned. The median band is very deep reddish cholocate in colour. The outer border appears to be almost as in normal *defensaria* except that the lines are heavier. The hind wings of both sexes seem to have a slightly more yellowish shade than in the normal form, particularly in the female, which in normal *defensaria*, is quite dark ashen. Beneath there appears to be little difference except that the lines are heavier in the variety.

This form does not appear so commonly in collections as one might expect, possibly because collectors neglect to start their work early enough in the season.

One would hardly imagine this form was *defensaria* unless it were seen in series.

Holotype.—♂, Cowichan Bay, B. C., April 26, 1906, in my collection, received through the kindness of Mr. F. H. Wolley Dod.

Allotype.—♀, Victoria, B. C., May 10, 1914, collection of Mr. E. H. Blackmore.

Paratypes.—5 ♂'s, April 21 to May 8, 1914 and 1915, 4 of them in Mr. Blackmore's collection, the fifth (with a somewhat intermediate, reddish, outer border; without date of capture) in the Victoria Museum collection; 2 ♂'s, Duncans, B. C., April 22, 1914, Victoria, B. C., April 25, 1914, E. H. Blackmore, in coll. Swett; 2 ♀'s, Victoria, B. C., April 25 and 30, 1914 and 1915, E. H. Blackmore, in coll. Swett; 5 ♀'s, Victoria, B. C., April 22 to May 20, 1914 and 1915, in coll. Blackmore.

Another very interesting variety of this spring form, which I believe to be a case of melanism, is the following:—

Xanthorhöe defensaria Gn., var. **suppuraria** var. nov.

Expanse 25-27 mm. The male has light ashen fore wings with very faint, wavy lines on the outer border and a very wide, black or reddish-black central band, nearly twice as broad as in var. *mephistaria* Swett. The female is similar to the male, except that the outer margin is of a pale, flesh colour with only the twin, black dots showing strongly. The hind wings are of rather a pale ashen colour and thin in texture, though not so much so as in var. *thanataria* Swett.

This appears to be a rare form and is much like *mephistaria* Swett except for the differences noted, viz., the wider, heavier median band and different shade of colour. In this variety, as well as *mephistaria*, the central band is solid black or reddish black, and the extradiscal and intradiscal lines can barely be seen.

Holotype.—♂, Victoria, B. C., April 25, 1915, E. H. Blackmore, in coll. Swett.

Allotype.—♀, Victoria, B. C., May 2, 1915, in coll. Blackmore.

Paratypes.—♂, Victoria, B. C., April 25, 1915, in coll. Blackmore; ♂, Victoria, B.C., June 2, 1914, E.H. Blackmore, in coll. Swett.

This includes all the forms of *Xanthorhöe defensaria* that might lead to confusion and they are connected by every intergradation, but I think it worth while only to describe the extreme forms, where I have a good series.

Summary of the varieties of *Xanthorhöe defensaria* Guen:—

	Time of appearance	Med. band of fore wing.	Outer border or outer third of fore wing.
X. defensaria Gn.	July 3—Aug. 31. (summer form).	Reddish chocolate (♀). Light brown suffused with blackish (♂).	Dark gray.
1. Var. *californiata* Pack.?—*amorata* Hulst.	July 3—Sept. 4. (summer form).	Bright reddish brown (♀). ♂ unknown, probably like typical form.	Light gray.
2. Var. *conciliaria* Swett.	July 23— Sept. 18. (summer form).	Reddish cinereous, almost blackish (♂ ♀).	Ochre yellow, (also basally).
3. Var. *mephistaria* Swett.	June 6—Aug. 1. (summer form).	Solid black or reddish black (♂ ♀).	Light ashen gray.
4. Var *thanataria* Swett.	Aug. 1—Sept. 25. (Chiefly Sept.—fall or late summer form).	Very narrow, lighter than typical, small sized (♂ ♀).	Pale ashen, almost without markings, more or less diaphanous.
5. Var. *gigantaria* Swett.	April 20—May 22. (spring form).	Very wide, dark reddish brown (♂), dark reddish brown to cinereous (♀).	Dark gray.
6. Var. *suppuraria* Swett.	April 15—May 2. (spring form).	Very wide black or reddish black (♂ ♀).	Pale ashen gray, sometimes ochreous tinge.

These times of appearance are only approximate but give the dates of my series. Whether *thanataria* Swett is a late summer form or a third brood is a question which can only be answered by breeding.

I believe these forms will be easily recognized, and fewer mistakes will be made in the future. Packard evidently did not have a clear conception of *Xanthorhöe munitata* Hüb., or *defensaria* Guen., for he mixed the species badly on plate VIII of the Monograph. Fig. 66 of this plate does not represent *munitata* Hüb., as Packard states, but male *defensaria* Guen. Fig. 67 of the same plate is not *munitata* var., as stated, but female *defensaria*, probably var. *californiata* Pack. *X. munitata* Hüb., has the intradiscal line strongly outcurved, where in *defensaria* it is nearly straight. Fig. 72, Pl. VIII, of the Monograph, appears very close to *munitata*, but there is always a doubt when figures are uncoloured.

Dr. Dyar discusses *X. defensaria* in Proc. U. S. National Museum, vol. XXVII, pp. 779-938, 1904. Mr. Wolley Dod compares *defensaria* and *munitata* in Can. Ent., vol. XXXVIII, p. 254, 1906.

In conclusion, I wish to thank Mr. E. H. Blackmore for the loan of specimens and valuable assistance, and Mr. H. Weiss for useful information and assistance in comparing *X. amorata* Hulst with *defensaria* Guen.

SOME MUSICAL ORTHOPTERA* AT CLARENDON, VIRGINIA.

BY H. A. ALLARD, WASHINGTON, D.C.

Miogryllus saussurei Scudd. In June, 1914, the writer captured several individuals of this small cricket in the short, matted grass of the dooryard of his home. These crickets appear very shy and are rather solitary in their habits. Their stridulation is a brief, rather faint, high-pitched, intermittent trill—tiiiii, tiiiii, tiiiii, tiiiii—very much resembling the intermittent trills of some species of *Nemobius*.

Anurogryllus muticus DeGeer. In early June, 1914, the writer found great numbers of these crickets in a small pine grove on a hillside just behind Mr. Able's house near Vinson Station. These

* The Orthoptera listed in this paper were kindy identified by Mr. A. N. Caudell of the U. S. National Museum.

crickets appear to be somewhat arboreal in their habits, and were always seen upon the trunks of the pines from one foot to eight feet above the ground. They were never observed upon the ground, unless disturbed and forced to leap from the tree trunks. Very often several crickets could be seen upon the trunk of one small tree. The stridulations of these interesting crickets were heard about sundown and in the early part of the night. These crickets appeared to be very susceptible to weather changes and were heard only on very warm evenings.

The trill is loud, continuous, high-pitched, very much resembling the trill of *Œcanthus quadripunctatus* or *Œcanthus nigricornis*. In fact, when the writer first heard these crickets he was inclined to believe he was listening to some species of *Œcanthus*. Although in early June, 1914, *Anurogryllus muticus* appeared to be very common in the pine grove mentioned, none were heard a month later. They were not heard in this grove in 1915. This species appears to be very uncommon in this region and has not been located at any other point.

Nemobius carolinus Scudder. This tiny *Nemobius* is very common beneath the leaves and grass of the roadsides throughout the summer. Its stridulation is a weak, continuous trill indefinitely prolonged. Great numbers of these crickets were trilling everywhere beneath the herbage of the roadsides in 1915. They are persistent singers and may be heard throughout the night. In the coolness of the early morning they appear to be especially musical. They keep well concealed beneath the dead and matted herbage, and are exceedingly difficult to capture.

Neoconocephalus robustus crepitans (Scudder). This cone-headed grasshopper is a very common species around Clarendon, Virginia, in August. If the evenings are warm and humid, their stridulations may be heard from sundown until well into the night. The stridulations of this insect are somewhat puzzling. Two well marked notes may be identified. The stridulations of the majority of individuals around Clarendon and Washington consist of a rather weak, continuous, snappy z-z-z-z-z-z. Occasionally, however, other individuals produce an entirely different note which is exceedingly loud, penetrating, and continuous, with a

peculiar, droning, buzzing whirr, and may be heard for long distances. So different are these notes that the writer was convinced he had captured another species. During the summer of 1915, several individuals of both groups were taken. Although it was first thought that those individuals characterized by the stronger note were generally larger and possibly came closer to *N. robustus robustus*, it was finally decided to refer all to the form *N. robustus crepitans*.

The question is not solved, however, and needs further investigation. Such well marked differences cannot possibly be associated with temperature relations, as the two stridulations may be heard in the same vicinity at the same time. The stronger note is far less commonly heard. Occasionally, stridulations somewhat intermediate between the two extremes may be heard.

Rehn and Hebard* find that the *N. robustus robustus* and *N. robustus crepitans* intergrade within very narrow limits (Ocean View, New Jersey; and Philadelphia, Pennsylvania) although intermediate material has been found as far south as the District of Columbia. It is interesting to note that Davis has noted differences in the stridulations of the two forms; the stridulations of *robustus* appearing to be louder than the stridulations of *crepitans*. Rehn and Hebard have noted a day song, or "sleep-song", for *N. robustus robustus*. They say: "This day song, or what might well be termed, sleep song, is in reality a brief and drowsy impulse giving just sufficient energy to the act of stridulation to demonstrate the sound produced when the vibrations are not at full speed, the irregularity of the sound resulting from the same cause." The writer has noted a similar drowsy, half-hearted day song in the case of *Neoconocephalus retusus* (Scudder).

It would be very interesting to determine to what extent hybridization could be brought about between typical forms of *robustus* and *crepitans*. It is possible that hybrid material would throw much light upon the exact status of these forms.

* "A synopsis of the Species of the Genus Neoconocephalus found in North American North of Mexico." Trans. of the Am. Ent. Soc. Vol. XL, No. 4, p. 365-413.

NEW SPECIES OF NEW ENGLAND SARCOPHAGIDÆ.*

BY R. R. PARKER, BOZEMAN, MONT.

Sarcophaga bullata, n. sp.

1913. *Sarcophaga georgina*** Felt, N.Y. State Museum, Bull. 165, Rept. State Entomologist for 1912, pp. 80–82, pl. 7, figs., 1, 2 and 3†. Habitats; description of larval habits and of puparium.

1914. *Sarcophaga* sp, Parker, Can. Ent., vol. 47, p. 422. Related to *S. cooleyi* R. Parker.

Types—Massachusetts Agricultural College, one male, one female.

Paratypes—Massachusetts Agricultural College, 1 ♂, 1 ♀; United States National Museum, 1 ♂, 1 ♀ (No. 19167); American Museum of Natural History, 2 ♂, 3 ♀; Boston Society of Natural History, 2 ♂; Cornell University, 1 ♂, 1 ♀; collection of J. M. Aldrich, 1 ♂, 1 ♀; collection of writer, 6 ♂, 5 ♀.

(♂) Third antennal segment two and one-half to three and one-half times length of second; anterior portion of cheek clothed with black, posterior with whitish hair; hairs fringing calypters dark at fold, otherwise whitish except that those on inner portion of margin of upper (anterior) calypter are often dark; all tarsi shorter than their respective tibiæ; anterior and posterior faces of posterior tibia with an equally strong beard of long, coarse, black hairs; hairy vestiture of lower surface of middle tibia increasing in length distally, short and not forming anterior and posterior beards; ventral surface of anterior coxa completely clothed with bristles that may be divisible into three irregular rows; only last two pairs of posterior dorsocentrals strong; except at sides, second and third ventral plates clothed with short, decumbent hair; genital segments dull orange, first either with hair-like, or weak marginal bristles.

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* Contribution from the Entomological Laboratory of the Massachusetts Agricultural College.

** Provisionally determined.

† Figure 4. labelled as the genitalia of this species, is of *Phormia regina* (Meigen).

(♀) Third antennal segment two to three times length of second; anterior portion of cheek clothed with black, posterior with whitish hair; hairs fringing calypters dark at fold, otherwise whitish except that those on inner portion of margin of upper (anterior) calypter are often dark; ventral surface of anterior coxa with other bristles than those of the irregular rows at each side, sometimes more or less distinct row between them; only last two pairs of posterior dorsocentrals strong; abdomen clothed with short, reclinate bristles; genital segments slightly protuberant; the two broad, lateral lips of the first genital segment dull orange, near their edges usually turned abruptly backward (more protuberant), spiracles nearest to anterior margin; fifth segment not discernible, its spiracles when visible seem to open through lips of notum sixth (first genital segment); ventral plates of genital segments usually concealed.

Length—9 to 15 mm., average 12 to 14 mm.

(♂) *Head*—Viewed from side parafrontals and genæ, with dark reflections. Breadth of front at narrowest part from one-half to four-sevenths eye width; cheek height varies from one-third to one-half that of eye. Front rather prominent, sides of frontal vitta usually parallel but often slightly convergent backward or the sides effaced just below ocellar triangle (especially in large specimens). Second antennal segment brownish at tip, rarely blackish throughout; third two and one-half to three and one-half times length of second, its inner, basal portion often pinkish or salmon-coloured; arista plumose to beyond the middle. Back of head somewhat convex, typically with two complete rows of black cilia beyond eyes, sometimes with a partial third especially dorsally, otherwise clothed with whitish hair that completely covers metacephalon. Anterior portion of cheek clothed with black, posterior with white hair. Gena sparsely clothed with short hair or sometimes with three irregular rows on that half nearest eye orbit.

Chætotaxy—Lateral verticals absent; vibrissæ inserted just above line of oral margin.

Thorax—Metanotum clothed with short, quite erect, close set bristles. Hairs covering anterior spiracle dark brown basally, at least their outer halves yellowish; those of anterior margins of

posterior spiracle either entirely dark brown or with yellowish tips, those of spiracular cover vary from brown with yellow tips to almost wholly yellowish. Epaulets dark.

Wings—Bend of fourth vein normally a strongly acute angle; anterior cross-vein more basal than end of first longitudinal; third vein bristly; costal spine vestigial; section III of costa equals approximately one and two-thirds times section V; posterior margin of alulæ with or without fringe of hair; calypters whitish, fringe of hairs dark, otherwise whitish, but those on inner portion of margin of upper (anterior) calypter often dark.

Legs—Dark; all tarsi shorter than their respective tibiæ. Posterior trochanter with well defined "brush," especially in large specimens: femur sub-cylindrical, clothed beneath with long hair that often becomes beard-like posteriorly; anterior face with three rows of bristles, those of intermediate row shortest and not developed distally; posterior face without ventral row of bristles; tibia sometimes slightly curved, anterior and posterior faces each with an equally strong beard of long, coarse, black hair: fourth segment of tarsus at least one-half fifth. Middle coxa with a single row of bristles: femur clothed beneath on posterior proximal half or more with long hair; anterior ventral row of short bristles complete, posterior row represented only by "comb" extending proximally to the long hair: hairy vestiture of lower surface of tibia increasing in length distally but short and not forming anterior and posterior beards; submesotibial bristle present. Ventral surface of anterior coxa completely clothed with bristles that are sometimes separable into three irregular rows, one at each side and an intermediate that is usually less complete and sometimes indistinct.

Chætotaxy—Anterior dorsocentrals short, slightly longer than vestiture of præscutum but slightly reclinate and not projecting above it; acrostichals absent; inner presuturals, if present, very weak: last two pairs postsutural dorsocentrals strong, anterior to these three or four pairs that are weaker than those before the suture; præscutellar acrostichals present: scutellar apicals present: usually three sternopleurals, sometimes two but generally only on one side: lower sternopleura with a single row of bristles.

Abdomen—Oval or somewhat conical; nota clothed above with short reclinate bristles, beneath with slightly longer, almost erect hair. Ventral plates, as a whole, with their sides converging posteriorly; vestiture of first long and erect, that of second and third short and decumbent except at sides. Posterior margin of fourth notum dorsally, also sometimes ventrally, usually of same colour as genital segments, sometimes not so coloured.

Chætotaxy—Second segment without marginal bristles; third with two, often very stout; fourth with complete row ending ventrally in long hairs.

Genital Segments—Prominent, often completely exposed, dull orange. First, (g. s.1) large, often partially yellowish pollinose, vestiture slightly shorter than that of second, "humps" almost bare, in profile weakly curved, marginal bristles weak or hair like; second (g. s.2) rotund, not flattened, anal area small and not extending above middle of posterior surface. Forceps (f.) darkened at least on distal half, in profile the fine, hairy vestiture is seen extending almost to tips of prongs, which are strongly curved forward and approximated almost to tips but latter slightly spread; base with upward flap-like extensions clothed with fine hair that is slightly shorter than vestiture of second segment. Base of fourth ventral plate usually shows as a rounded ridge the posterior extremity of which is slightly knobbed showing prominently in profile, inner portion of lamellæ at base thickly set with short, stubby bristles forming a "brush."

Genitalia—Distinctive. Accessory plates (a. p.) hairy; anterior claspers (a. c.) scarcely longer than posterior. (p. c. =posterior claspers; p. =penis.)

(♀) Females differ from males in the following important characters.

Head—Breadth at front at narrowest part varies from about five-sixths to same as eye width. Upper, inner orbits of eyes diverging downward.

Thorax—Bristly vestiture shorter.

Legs—All tarsi equal in length to tibiæ. Posterior trochanter with slender apical bristle: femur spindle-shaped; anterior face essentially with but two rows of bristles, those of lower row few and well separated, intermediate row may be represented by two

or three bristles proximally: posterior face with ventral row of long, well separated bristles on proximal half or slightly more. Anterior and posterior ventral rows of middle femur complete, but bristles weak and inconspicuous distally: submesotibial bristle very strong, sometimes a short bristle just above it.

Chætotaxy—Anterior and anterior postsutural dorsocentrals shorter: usually three sternopleurals, sometimes four on one or both sides: lower sternopleura with a single row of bristles, often with several others just anterior to its lower part, otherwise clothed with hair.

Abdomen—Oval; vestiture practically throughout of short, reclinate bristles.

Genital Segments—Slightly protuberant, visible only from beneath or sometimes bristles of first segment may be seen from above. The two broad lateral lips of the first genital segment distinctly separated dorsally, their edges usually abruptly turned backward and fringed with bristles that decrease in length and size ventrally, dull orange, often yellowish pollinose, spiracles nearer to anterior than posterior margin. Fifth segment not discernible as such, its spiracles rarely visible and apparently open through lips of sixth segment (first genital). Ventral plates of genital segments concealed.

Described from 15 males and 12 female specimens, 62 others examined.

Range—New England: Mass.: Woods Hole, Cohasset, Gloucester, Rockland, North Abington, Andover, Forest Hills, Wellesley, Amherst, Springfield; Me : Fryeburg, Capens; Conn.: New Haven.

United States—N. Y., N. J., N. C., Ga., Fla., La., Ill., Ohio, Ind.

The fact that the vestiture of the anterior portion of the cheeks is black and that the posterior is white together with the two beards of equivalent value on the posterior tibiæ is sufficient to distinguish males of this species from others known in New England at least. *Sarcophaga hæmorrhoidalis* Meigen and *S. dalmatina* Schiner while very distinct might possibly be confused with it by one not familiar with the group; the above characters will immediately differentiate them. Females of both these species

are separated from *S. bullata* by the character of the cheek vestiture and the notum of the first genital segment which is composed of one piece, as are the abdominal nota, and not divided into two lips. In addition, the female of *S. dalmatina* has one complete row of cilia behind the eyes instead of two.

In a discussion following the description of *Sarcophaga cooleyi* R. Parker (Can. Ent., vol. 46, pp. 417–423, Dec., 1914), known at present only from Montana, Wyoming and Utah, it was suggested that this species and *S. bullata* were close relatives. The genital segments of the females are very similar; those of *cooleyi* are interesting in that they show (at the sides) parts of a distinct fifth abdominal (sixth morphological) segment with its spiracles.

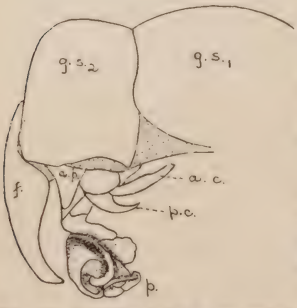

Fig. 19. *Sarcophaga bullata* n. sp., genital segments of male.

Among my material are several reared specimens of *S. bullata* which have light rather than dark palpi. The parts of the penis may be less compact and separated to a greater extent than figured in the drawing.

Felt (1913, see bibliography) described the larval and pupal stages from specimens reared on the head of a dead calf. From larviposition to adult was found to take from thirty-four to thirty-six days (Aug. 12 to Sept. 15 to 17). Dr. Felt very kindly sent me six females from the specimens reared, which are unquestionably *S bullata*. Metz (Station for Experimental Evolution, Cold Spring Harbor, Long Island), during the summer of 1914 reared this species on meat in several experiments. Undoubtedly it breeds in carrion. I also have records of its capture on cow dung, and at Springfield, Mass., captured it on human excrement. One specimen in the Massachusetts Agricultural College collection is labelled as caught flying around the "burrows of *Cryptorhynchus lapathi* (Linnæus)." A female received from C. H. Richardson was captured on cow dung. Specimens have also been reared from eggs.

(To be continued)

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POPULAR AND PRACTICAL ENTOMOLOGY.

THE CONTROL OF ANTS IN DWELLINGS.—A NEW REMEDY.*

BY ARTHUR GIBSON, CHIEF ASSISTANT ENTOMOLOGIST, DEPARTMENT OF AGRICULTURE, OTTAWA.

A simple remedy for the control of ants in dwellings has long been a desideratum. The usual recommendations are: locate the nest outside and destroy the occupants by pouring into the entrance a quantity of bisulphide of carbon, kerosene emulsion, or even boiling water; trap the ants by placing on the shelves or other parts of the house frequented, sponges which have been soaked in sweetened water and which afterwards, with the ants therein collected, are dropped into boiling water; etc. Such other well-known recommendations as have been made from time to time need not be mentioned here.

During the summer of 1916, the common carpenter ant, *Camponotus pennsylvanicus*, was extremely abundant in a summer cottage in the Gatineau hills near Chelsea, Que., which my family occupied throughout the season. They were particularly numerous about the kitchen, frequenting especially a cross-beam near the chimney, close to which they evidently had established their headquarters. From this point they wandered throughout the kitchen and dining-room, getting into bread and cake boxes, etc., in fact, proving generally a decided nuisance. The problem of controlling ants in dwellings, therefore, became an immediate personal one, but fortunately a very simple one. Knowing the success which the United States Bureau of Entomology had had in controlling roaches with sodium fluoride, I obtained some of this powder and applied it during the evening of May 24, by

* Contribution from the Entomological Branch, Dept. of Agriculture, Ottawa.

means of a small puffer or dust gun. The powder was dusted into the openings between the beam and the roof, as also into other cracks or openings nearby. The following morning the ants were not nearly so noticeable, so I went over the ground again on the evening of May 25. Since this last date, practically no ants were seen in our cottage in the places where previous to the use of the sodium fluoride they were very abundant. The result of our first test of the use of this chemical as a remedy for ants in dwellings was so satisfactory that every opportunity of further experimenting with it was taken advantage of.

On May 27, I visited another summer cottage in the outside kitchen of which the common shed-builder ant, *Cremastogaster lineolata*, was present in countless numbers, causing much anxiety from its habit of crawling over tables, shelves, etc. In this dwelling the ants also frequented the beams supporting the roof. The sodium fluoride was dusted into the cracks between the beams and the roof and also on to shelves, etc., where the ants were present in numbers. An examination was made of this kitchen during the following evening and practically all the ants had disappeared, only a few here and there being observed. Only one application was made. The owner of this dwelling recently informed me that no further annoyance was caused by the ants during the remainder of the season.

In other nearby cottages, too, the same results were obtained, and from owners of summer dwellings on the Rideau Lakes and other places in the vicinity of Ottawa, to whom recommendations were made to use the sodium fluoride, the reports received have been similar and in all cases satisfactory. In one instance in the city of Ottawa the carpenter ant, *Camponotus pennsylvanicus*, was present in annoying numbers in the kitchen of an apartment house. The insects entered through a door which opened on to a balcony. In this instance the sodium fluoride was simply dusted on the floor near the door. After its use on two occasions only no further ants entered the apartment. In this latter instance the powder was simply placed in a shell vial and dusted on to the floor through a cheese-cloth covering which had been tied over the opening.

The Susceptibility of the Eggs of Aphis Pomi and Aphis Avenæ to Hydrocyanic Acid Gas Formation.

BY WILLIAM A. ROSS, DOMINION ENTOMOLOGICAL LABORATORY, VINELAND STATION, ONTARIO.

It is of economic interest to note that the fumigation of young apple trees with hydrocyanic acid gas just before or shortly after the buds commence to swell not only controls the San José scale, but it also destroys the eggs of aphides.

In the spring of 1914, we procured from a local nursery seven apple trees well stocked with the eggs of *Aphis pomi* and *Aphis avenæ*. Three of the trees were fumigated for forty-five minutes with hydrocyanic acid gas (1 oz. KCN to 100 cubic feet, 1:1:3 formula), and the others were used as checks. None of the eggs on the fumigated nursery stock hatched, whereas large numbers hatched on the check trees.

This spring the foregoing experiment was duplicated, and the same highly satisfactory results were obtained—100 per. cent of the aphid eggs were destroyed.

In the 1914 experiment the nursery stock was fumigated eight days, and in the 1916 experiment six days before the eggs on the check trees commenced to hatch.

A CHANGE OF SYNONYMY IN XYLOMIGES (LEPID.).

BY F. H. WOLLEY DOD.

The species described by Smith as *Xylomiges pallidior* is identical with *simplex* Walk. Harvey's *crucialis*, hitherto misidentified as *simplex*, is distinct. Even after seeing Smith's type and possessing specimens of both forms, it was some years before I was at all sure that the species really existed, as the difference appeared to be merely varietal. But, as time went on and I saw and acquired more material, their distinctness became apparent. Having become satisfied as to the existence of two species, judged by superficial characters alone, I got Mr. Tams to make several mounts of the genitalia of each, including Vancouver Island specimens of both forms. These were found to differ in such a way as to make their separation quite easy. Being at present separated from my specimens and mounts by several thousand miles, I am unable to state concisely just what these differences are, but hope to make it clear some day.

November, 1916.

Smith published a photograph of his type in the Canadian Entomologist, leaving the identity of his species beyond doubt. I also possessed a specimen "Xd. type" with Walker's *simplex*. But as that comparison had been made at a time when I had failed to recognize two species, I was unable to place any reliance on the comparison. I was, however, quite satisfied as to the distinctness of *crucialis* from *pallidior*. Hampson published a figure of *pallidior*, made from another, of the type, sent to him by Smith, which is quite recognizable. His woodcut of *simplex* is not so good, but my notes on Walker's type were such as to lead me to suspect strongly that I had made a mistake and that Smith also had fallen into his oft-repeated error, in that, whilst recognizing two very closely allied species, instead of seeking a re-identification of *simplex*, he had chosen to assume its correctness, and created a synonym. I accordingly sent Sir George Hampson a few specimens of each, stating my suspicions, carefully pointing out the distinctive characters, and requesting him to re-examine Walker's type. His diagnosis was in accordance with my suspicions, and I have since visited the British Museum and corroborated his evidence, which results in the synonymy here cited. I regret being unable, at present, to publish a close comparison of the two species, for reasons given above, but feel safe in emphasizing the following points: *Crucialis* is slightly longer-winged than *simplex*, the discoidal spots are a trifle smaller, and the subterminal line or series of blackish streaks is arranged so as to form two oblique triangular shades. In *simplex* they form a more regular and even series, about parallel with the termen. The two species occur together and are not rare on Vancouver Island. Whilst *crucialis* has usually the clearest white ground colour of the two, both have a dark, almost suffused, grey variation. I have been misled into misteking the extreme dark variations of either species for one form, the corresponding light variations for the other, and must warn others against falling into this error. It must be admitted that the two species are not easily distinguished unless well known.

The synonymy stands as follows:—

Xylomiges simplex Walk.
" *pallidior* Smith.
Xylomiges crucialis Harr.
" *simplex* Smith et al., nec Walk.

NOTES ON THE PSAMMOCHARIDÆ DESCRIBED BY PROVANCHER, WITH DESCRIPTION OF A NEW SPECIES.

BY S. A. ROHWER.

Bureau of Entomology, Washington, D. C.

The following notes on the types of the species of Psammocharidæ, described by Abbé Provancher, were made in June, 1915, and presented with the hope that they will enable Hymenopterists to understand these species better. The new species here described had previously been considered to be *minima* Provancher, but is easily distinguished from that species as the following notes will show.

No types were definitely designated by Provancher, and in the collection there is no indication as to which specimen is type. In this paper the word "type," etc., is used in the sense of "electrotype."

Ceropales (*superba* Provancher)—**robinsoni** Cresson.

Type in Harrington collection; paratype bearing yellow label "766" Dernière Provancher Collection Public Museum, Quebec.

The synonymy indicated by Fox is no doubt correct.

Ceropales minima Provancher.

Type a male with blue label "124" (script) and yellow label "1420" (printed) in Dernière Provancher Collection, Public Museum, Quebec.

This is very probably a dark form of *fraterna* Smith, although no specimens with as few yellow marks on the abdomen are available. In the type the dorsal aspect of the propodeum is granular with a feeble, short, median sulcus, the posterior face is transversely aciculato-granular; the third cubital on the cubitus is twice as long as the second, and on the radius but little shorter than the second; the head is granular and has no median sulcus on the front.

Ceropales foxii, new species.

In Fox's synopsis of North America Ceropales (Trans. Amer. Ent Soc., vol. 19, 1892) this species will fall near *femoralis* Cresson,

but may be distinguished from it by a number of characters as the following description will show.

Male.—Length 5 mm. Clypeus very gently, arcuately emarginate; front granular and with a few scattered distinct punctures, and a shallow elongate fovea at about the middle; vertex and posterior orbits shining almost impunctured; postocellar line distinctly shorter than the ocellocular line; antennæ subequal to the length of the head and thorax, the third and fourth joints subequal; thorax shining with a few sparse punctures; the dorsal plate of mesepisternum with larger punctures than the lower; second pleural suture foveolate; propodeum granular with a distinct sulcus, the base of which is foveolate; nervulus slightly antefurcal; first intercubitus strongly curved towards the base; second and third cubital cells subequal on the radius, but on the cubitus the third is distinctly longer; longer calcarium of hind tibiæ three-fourths the length of the hind basitarsus; abdomen shining. Black; clypeus except a basal median spot, inner orbits to near top of eye, spot between antennæ, scape beneath, posterior orbits except medially, lateral anterior dorsal angles and posterior margin of pronotum, spot on metanotum, and lateral, apical spots on first three tergites yellow or yellowish-white; flagellum piceous; legs beyond bases of femora rufo-piceous; wings hyaline, venation yellowish, costa, subcosta and base of stigma brown; posterior face of propodeum and the hind coxæ with dense silvery pile, the rest of the body without dense pile.

Falls Church, Va. Described from one male collected July 22, by S. A. Rohwer and named in honour of W. J. Fox, the reviser of the North American species of this genus.

Type—Cat. No. 20118, U. S. N. M.

Ageniella atrata (Provancher).

Location of type not known. Allotype (♂) has blue label "125" (script) and yellow label "1417" (printing), and is in Dernière Provancher Collection, Public Museum, Quebec.

The allotype is the same as the species treated by Banks (Jn. N. Y. Ent. Soc., vol. 19, 1912 (1911) p. 234) under this name.

Ageniella perfecta (Provancher).

Type male bearing yellow label "783" in the Dernière Provancher Collection, Public Museum, Quebec.

The type runs to *perfecta* in Banks' table (Jn. N. Y. Ent. Soc., vol. 19, 1912 (1911) p. 234) but differs from a specimen (in Banks' collection) determined as that species in the shape of the third cubital, which is larger and has the outer margin oblique (not curved) and the second recurrent is a little beyond middle.

Ageniella rufigastra (Provancher).

Type female bearing blue label "122" (script) and yellow label "1419" (printing) in Dernière Provancher Collection, Public Museum, Quebec.

This species has usually been considered a synonym of *congrua* Cresson, but the type differs from a homotype of *congrua* made by Banks (in coll. Banks) in the blackish hind legs and in the decidedly postfurcal nervulus.

Episyron griseus (Provancher).

Provancher's type is a male, not female, and is in the Dernière Provancher Collection in the Public Museum of Quebec, bearing a yellow label "1011" on pin.

This species is related to *biguttatus* etc., but may be distinguished by the angulate posterior margin of pronotum and absence of markings on the abdomen. The abdominal markings are, however, not constant, and specimens from Canada (Baker collection) in the National Museum, which have the posterior margin of the pronotum angulate but have two lateral spots on the third tergite, have been placed under Provancher's species.

Pompiloides apicatus (Provancher).

Type female bearing yellow label "769" in Dernière Provancher Collection, Public Museum, Quebec.

The following notes may aid in the determination of this species. Propodeum shining with a distinct median furrow; second and following tergites with appressed pile; nervellus postfurcal; first intercubitus strongly curved; third intercubitus

distinctly angulate; eyes nearly parallel the antennocular line longer than the interantennal line; antennæ rather short and stout.

Pompiloides (*castaneus* Provancher) **argenteus** (Cresson).

Type male bearing yellow label "774" and name label "*argenteus* Cress." Dernière Provancher Collection, Public Museum, Quebec. Provancher's manuscript list proves that this is type of *castaneus*.

Argenteus (Cresson) agrees with all of the notes made on *castaneus*, and there seems to be but little doubt that the synonymy indicated by Provancher is correct.

Batazonus coquilletti (Provancher).

Type male Cat. No. 1980, U. S. Nat. Mus.

This is probably a synonym of *navus* Cresson.

DESCRIPTION OF A NEW SESIID.

BY WILLIAM BEUTENMULLER, NEW YORK.

Gaëa arizonensis, sp. nov.

Female.—Fore wings opaque, golden orange red, dusted with fuscous in the intervenular parts. All the veins, rather heavily marked with fuscuous. Discal mark fuscous, edged with orange red. Hind wings transparent, veins fuscous, and the outer margins narrowly edged with orange red. Fringes fuscous. Under side of fore wings with the intervenular parts considerably brighter, orange red, as also the transverse discal mark, which is wholly orange red. Hind wings similar to the above, but with the narrow, orange red margins brighter. Head black; palpi yellow. Antennæ orange red, fuscous terminally and decidedly clavate. Abdomen brown-black with a broad, yellow band on the posterior edge of each segment, except the fourth, the last three bands broader than the three basal ones. Anal tuft lemon yellow. Under side of abdomen, with all the bands much broader and the fourth also banded. Posterior legs yellow, joints black, femora black (remaining legs wanting). Expanse 25 mm.

Habitat.—Pinal Mts., Arizona.

Described from a single female. Type: collection Dr. William Barnes.

1.—Type of *Tortrix oleraceana* sp. nov., natural size.
2.—Type of *T. oleraceana*, enlarged four times.
3.—Leaf of cabbage showing edges rolled by the larva of *T. oleraceana*.

A NEW SPECIES OF TORTRIX OF ECONOMIC IMPORTANCE, FROM NEWFOUNDLAND (LEPIDOPTERA: TORTRICIDÆ).*

BY ARTHUR GIBSON, CHIEF ASSISTANT ENTOMOLOGIST, IN CHARGE OF FIELD CROP INSECT INVESTIGATIONS, DEPARTMENT OF AGRICULTURE, OTTAWA.

Towards the end of July, 1915, Mr. Albert J. Boyle, the Acting Secretary of the Newfoundland Agricultural Board, St. John's, Newfoundland, sent to the Dominion Entomologist leaves of cabbages which were infested by a small tortricid larva. The caterpillars pupated in transit, and moths emerged at Ottawa as follows: three on August 9 and one on August 17. The caterpillars, we were informed, were present in very destructive numbers on some farms near St. John's, Nfd., in fact on one farm, according to Mr. Boyle who personally investigated the outbreak, the whole of the first and much of the second plantings of cabbages were destroyed by the larvæ. The larva curls the leaf like other tortricids; this habit is shown in the figure herewith, the photograph having been taken from material received from St. John's.

Mr. Boyle informed us that oftentimes in spring cabbage plants are imported into Newfoundland from Ireland, and for this reason we thought that the moth might be the European species, *Tortrix virgaureana* Tr. Two specimens were, therefore, forwarded to Dr. Guy A. K. Marshall, Director of the Imperial Bureau of Entomology, who submitted them to Mr. Durrant, of the British Museum. Mr. Durrant examined the specimens but could not associate them definitely with *virgaureana*. Dr. Marshall reported that the black spots in the Newfoundland insect are much better defined than in any of the British species and are rather more numerous. Mr. August Busck, of the U. S. National Museum, also kindly examined a specimen of the Newfoundland moth and reported that it is undoubtedly closely allied

* Contribution from the Entomological Branch, Department of Agriculture, Ottawa.
November, 1916.

to *Tortrix wahlbomiana* L. var. *virgaureana* Tr., but that it did not match any of the more than fifty bred European specimens in the Museum. He also added, "nor is it any of our described North American species."

In view of the economic importance of the insect it seems desirable to give it a definite name, and, therefore, I propose the following:

Tortrix oleraceana, sp. nov.

Labial palpi gray outside irrorated with cream, pale cream inside with darker tips. Antennæ, head, body and fore-wings neutral gray, thickly irrorated with cream. The fore-wings bear conspicuous, blackish, irregular spots. In the inner half of the wing these spots are arranged to form an imperfect letter W; they occur as follows: a double transverse anterior series, more or less joined together and extending from the costa to a distance of about three-quarters of the width of the wing; from the posterior end of the anterior series the spots extend obliquely forward to within one-quarter the width of the wing from the costa, and then obliquely backward, joining, a little below the centre of the wing, the inside spots of a double median series which form the distal arm of the W and extend rather closer to the inner margin than the anterior series. The spots in the median series are not so frequent. In the space above the internal angle of the W there are also a few blackish spots. In the distal half of the wing a number of blackish spots are present, extending from the costal to the dorsal area; these latter spots are not arranged after any pattern but occur chiefly toward the margins; near the outer margin the spots are distinctly larger and form a submarginal row. Outer margin blackish with a cream edge. Cilia concolorous with wing. On the costa near the outer row of the transverse anterior spots are two conspicuous cream-coloured areas between which is a blackish blotch; two other distinct cream-coloured costal areas are also present in the distal half of wing, the inner one of which adjoins the outer arm of the W. Between these two latter cream-coloured spots there is a blackish, V-shaped costal spot. In addition to these pale costal areas, there are also a few other cream-

coloured spots, not so large or distinct, chiefly in the apical area of the wing.

Hind wings wholly neutral gray, irrorated with cream. Body beneath pale metallic cream. Legs gray, outside irrorated with cream and crossed by bands of the same colour; pale cream inside.

Alar expanse 19 mm.

Type deposited in collection of the Entomological Branch, Department of Agriculture, Ottawa.

Variations.—During the present year (1916) the insect has again been destructive in Newfoundland, and Mr. Boyle has forwarded to us specimens of the larvæ from which additional moths have been reared. The description of the type given above answers closely to all of the specimens reared (8) with the exception of two specimens which differ in having each fore-wing crossed with two irregular whitish bands, in addition to which there is a basal and an apical patch of the same colour. These specimens are labelled metatypes A and B respectively in the collection of the Entomological Branch. The bands and patches on the fore-wings of metatype A are conspicuously whitish, those on B being more of a sordid white.

THE HEATH COLLECTION OF LEPIDOPTERA.

BY F. H. WOLLEY DOD.

(Continued from Page 232.)

Hadena sp. A single specimen without date, broken and verdigrised, standing as *didonea* Sm., I believe to be of an undescribed species closely allied to *indirecta* Grt., and use a manuscript name for it in my private notes. A specimen of it stood wrongly under *didonea* in Smith's own collection. I have seen some half dozen specimens from widely separate localities.

Hadena egens Walk. (syn. *transfrons* Newm.).

Hadena claudens Walk. Some of the specimens stood as *albertina* Hamps., possibly on my authority. Dr. McDunnough

is of the opinion that *albertina* is not distinct from *claudens*, which is very likely correct.

Hadena misclioides Gn. *Macerata* Sm. under which name the species stood, is the same thing. So also is *miscellus*.

Hadena fractilinea Grt.

Polia contacta Walk. (syn. *pulverulenta* Sm.). Two specimens, standing as *extincta*, doubtless on Smith's authority. It may possibly be correct, but *extincta* is at present unidentified in collections.

Polia acutissima Grt. (syn *medialis* Grt.). Heath used often to distribute this species as *confragosa* Morr. That is very likely correct, though no one is able to state so positively at present.

Dryobota illocata Walk.

Hyppa xylinoides Gn.

Trachea delicata Grt. One specimen.

Euplexia lucipara Linn. Mr. Tams finds that the male genitalia of all the North American *lucipara* he has so far examined differ from those of British specimens.

Actinotia ramosula Gn. One female, July 30th, 1910.

Dipterygia scabriuscula Linn.

Pyrophila pyramidoides Gn.

Helotropha reniformis Grt. A very fine and variable series. Some stood under *plutonia* Grt.

Laphygma frugiperda S. & A. A good series. A single specimen also did duty for *Euxoa acornis*, a species not in the collection.

Homohadena stabilis Sm.

Homohadena infixa Walk. This stood as *fifia* Dyer, which is possibly correct.

Homohadena badistriga Grt.

Oncocnemis atrifasciata Morr. One specimen.

Oncocnemis viriditincta Sm. One specimen.

Oncocnemis poliochroa Hamps.

Oncocnemis riparia Morr. One specimen, amongst *cibalis*.

Oncocnemis cibalis Grt.

Adita chionanthi S. & A.

Rhynchagrotis gilvipennis Grt.

Rhynchagrotis rufipectus Morr.

Rhynchagrotis placida Grt. The species stood also as *minimalis* and *anchocelioides*.

Rhynchagrotis alternata Grt.

Adelphagrotis prasina Fabr.

Platagrotis pressa Grt. Other specimens of it stood as *condita* Gn.

Euretagrotis sigmoides Gn.

Euretagrotis perattenta Grt. The specimens were of the dull, poorly marked form named *innatenta* by Smith.

Euretagrotis attenta Grt.

Pachnobia littoralis Pack.

Pachnobia salicarum Walk.

Agrotis ypsilon Rott.

Peridroma occulta Linn. A series under the correct name, and a rubbed series elsewhere as *Polia pulverulenta* Sm.

Peridroma astricta Morr.

Peridroma margaritosa Hbn.

Noctua baja Linn.

Noctua normaniana Grt.

Noctua bicarnea Gn. Several specimens, mostly mixed with *treatei*, and one with *collaris*. Manitoba specimens appear to be rather hard to separate from *treatei*. I have never seen it from west of Manitoba.

Noctua treatei Grt. Two specimens.

Noctua substrigata Sm. One specimen, July 18th, 1911.

Noctua c-nigrum Linn.

Noctua cynica Sm. A series stood under *cynica*, *rubifera* and *rosaria*. In describing *cynica* Smith Stated that it was separable from *rubifera* only by male genitalia. So far I have found nothing to match what he figures as genitalia of *rubifera*.

Noctua rosaria. Two males. Their resemblance to *cynica* was closer than that of any I had previously seen. I have referred this species to *rubi* View, but Mr. Tams finds that the genitalia differ.

Noctua fennica Tausch.

Noctua plecta Linn.

Noctua collaris G. & R.

Noctua haruspica Grt. The largest specimen stood under this name, and smaller ones under *inopinatus*. *Inopinatus* is scarcely a recognizable variety.

Noctua clandestina Harr. A few worn *haruspica* were mixed with this series. One very badly worn *clandestina* stood by itself as *havila*. Elsewhere, five worn specimens, and one of *rufipectus* stood as *Amphipyra tragopoginis*, which was not in the collection.

Noctua atricincta Sm.

Chorizagrotis auxiliaris Grt., with its varieties *introferens* Grt., and *agrestis* Grt. Specimens also stood under *soror* Sm. The latter name does not refer to a distinct species, but I am unable at present to designate the exact variety.

Chorizagrotis balinitis Grt. Two specimens. A few forms of *auxiliaris* stood associated with them.

Chorizagrotis thanatologia Dyar. There were two specimens which I consider referable to this species. One fine male was near var. *sordida* Smith, and a female was var. *perfida* Dod. Both the specimens stood under *tessellata*.

Rhizagrotis flavicollis Sm.

Rhizagrotis perolivalis Sm. Other specimens of it stood as *plagigera* Morr.

Feltia ducens Walk., and the small, pale var. *hudsonii* Sm.

Feltia herilis Grt.

Feltia venerabilis Walk.

Feltia volubilis Harv.

Porosagrotis mimallonis Grt.

Euxoa segregata Sm. Four specimens, a ♂ and 3 ♀♀. A female bore date Sept. 29th, 1903. Another ♀ had red ink label No. 177. Very rare in Canada.

Euxoa niveilinea Grt. Two males, standing as *quadridentata*, I decided were this species.

Euxoa ridingsiana Grt. (syn. *maimes* Sm.).

Euxoa dargo Strk. One specimen, as *rumatana* Sm., which is an exact synonym.

Euxoa velleripennis Grt. And other specimens of it as *perpolita* Morr.

Euxoa catenula Grt (syn. *contagionis* Sm.) Two specimens, of which one female only was dated, Sept. 24th, 1910. It was a surprise to see this species from Manitoba. It is extremely rare in Canada.

Euxoa scandens Riley. Standing as *Porosagrotis vetusta* Walk., which was not in the collection.

Euxoa deterra Walk.

Euxoa poncha Smith Three males, fortunately all dated, Sept 17th, 1904; Sept. 13th, 1910, and Sept. 20th, 1911. Heath had presented me with a fourth specimen about a year previously. It had stood in his collection as *citricolor* on Smith's authority. That determination was obviously wrong, though it resembles it in colour. I submitted a specimen to Messrs. Barnes and McDunnough, who decided that it was almost certainly *poncha*, one of the last species described by Smith, from Poncha Springs, and other localities in Colorado. It is allied to *medialis* and *cænis*, but very closely to *citricolor*.

Euxoa messoria Harr. A series correctly, and others as *fuscigera* Grt., and *septentrionalis* Walk. Two specimens of *pindar* Smith stood under *abar* Strk. I am under the impression that *pindar* is a variation of *messoria*. *Abar* Strk. is *divergens* Walk. I have seen Strecker's type.

Euxoa pleuritica Grt.

Euxoa incallida Sm. Some specimens stood separated as *quinquelinea* Sm.

Euxoa rena Sm. Standing as *dissona* Moschl.

Euxoa declarata Walk. (=*insulsa* Sm., nec Walk.). This species was very badly mixed. A confusion of it with *albipennis* is always excusable, as they are really very close allies. A worn series did duty for *intrita* Morr., and an aggregation referred to *titubatis* consisted principally of worn *declarata*.

Euxoa albipennis Grt. A long series stood under this name and *verticalis*. The latter is a form about intermediate between

albipennis and *declarata*, and its exact status cannot at present be determined, as a long series appears to intergrade with both, with a distinct balance in favour of *declarata*. The same may be said of *spectanda* Smith. The most interesting evidence deduced from Heath's material in this group, showed the presumed identity of *indensa* Sm. This was described from Cartwright shortly before Smith's death. Several years previously I had pointed out to Smith that Manitoba specimens associated with *albipennis* in his collection were of the form he had described from a unique as *malis*. But the type of *malis* happens to be a small and rather stunted specimen, and he apparently ignored the suggestion, as he never mentioned *malis* in his description of *indensa*. The *indensa* of the Heath collection was *malis* Sm., and the description fits. I have been familiar with the form for many years, and believe it to be a pale grey variation of *albipennis*.

Euxoa tessellata Harr. A series under this name, and another under *focinus* Sm., which is the same species.

Euxoa basalis Grt.

Euxoa ochrogaster Gn. Four small specimens of this species stood separated as *acutifrons* Sm., presumably on Smith's authority. I believe *acutifrons* to be a reddish form of *tessellata*, approaching var. *nordica* Sm. The resemblance of these small *ochrogaster* to reddish specimens of *nordica* was very striking, and Smith's error in this case was less unjustifiable than was so often the case with his determinations.

Euxoa idahoensis Grt. Two specimens, as *furterus* Sm. which is very likely the same species. A specimen of apparent *ochrogaster* stood with them, and indeed resembled them so remarkably that the misassociation was quite excusable.

Euxoa obeliscoides Gn. Smith re-described from Manitoba specimens as *infusa*. Specimens from this region almost entirely lack the red shades of typical *obeliscoides*, though Smith's "species" was not based on the colour difference.

Euxoa divergens Walk.

Euxoa redimicula Morr.

Euxoa tristicula Morr., and the variety without the black markings, *remota* Smith, which he re-described as *nesilens*.

COLLECTING NOTES AND RANDOM OBSERVATIONS ON THE MAINE COLEOPTERA.

BY C. A. FROST, FRAMINGHAM, MASS.

Cicindela purpurea limbalis Klug. Two female specimens of this variety, taken at Wales, June 15, 1909, are very much like the single specimen from Mt Desert Island that was given me by Mr. E. D. Harris.

Cicindela formosa generosa Dej. A single specimen of this species was seen at the roadside in Monmouth, June, 1912, and is the most eastern record that has come to my notice. I once took a few at Ogunquit Beach, September 17, 1903. They were not along the beach with the swarms of *hirticollis*, but back on the high sand dunes and on the slope toward the meadow behind it.

Omophron americanum Dej. My first specimen of this common but interesting species was found when in bathing in Lake Cochnewagin at Monmouth, June 20, 1907. It was driven out while walking on a small sand pit that extends out along a swampy meadow, and further investigations by treading about and throwing water drove them from their burrows by dozens. They also occur along the sandy margins of small brooks where the vegetation is sparse and, like *Elaphrus*, often appear before the eyes as if they had sprung out of the ground or had magically evolved from the bare sand.

Elaphrus clairvillei Kirby. I secured a good series of this fine species at Wales, July 9, 1913, along the edges of a meadow through which runs a small brook. They were found at the line where the growth of alders and other small trees met the rushes of the wet, and in some places very soft, meadow bottom. The first specimen was found under a bit of bark in a small area of bare mud under a large swamp maple on July 6, but I was not able to thoroughly explore the swamp and took only six specimens. A few days later I started out bright and early, armed with a pair of rubber boots, and worked along the edges of the bushes for a quarter of a mile or more. They could be driven into sight and easily captured by treading carefully about a small area of from

six to ten feet in diameter. Rarely more than one specimen was taken in a spot, and the eyes had to be constantly fixed on the ground to get any. An entire day was spent at this back-breaking collecting, and when sunset came I felt very much as I used to feel after a day of potato digging.

Elaphrus olivaceus Lec. After returning home and critically examining the catch of *clairvillei*, I was delighted to find two specimens that I thought were *lævigatus*, but comparison with the single specimen in the LeConte collection at Cambridge showed them to be typical *olivaceus*, which I had supposed was a mountain species. These specimens were taken out in the open meadow at the edge of the brook on bare and soft mud. This sluggish, winding, meadow stream which is barely two feet wide in places and in others scarcely traceable, can be but a few hundred feet above sea level, and is hidden between hills of more than a hundred feet rise. On the west, a mile away, is Sabattus Mountain, the highest elevation for miles around. The vegetation of the meadow is the common, coarse, broad-leaved grass of the low lands in Maine, and along the edge *Alnus incana* which runs up in places to meet the juniper of the bare and rocky pasture land. Within the last few years the larger growth of the hillsides has been cut off.

Elaphrus cicatricosus Lec. On June 25, 1912, and July 16, 1914, I visited the woodland swamp on the shore of Lake Cochnewagin at Monmouth where I had found this species in 1910. It is rather remarkable that three specimens were taken on each of the three years, one specimen in one spot and two in the other, and either spot can be covered with a wash tub. One additional specimen was taken after thoroughly "treading" over the thousand or so square feet of swamp in 1914. No specimens could be found in the denser growth where no sun entered and no grass grew.

Blethisa quadricollis Hald. My only specimen of this species was taken at Wales, June 23, 1912. I had dammed up a tiny rivulet to drive out small species of beetles, and the rising water chased into view this fine Carabid.

Badister pulchellus Lec. While hunting for *Elaphrus* at Wales, as previously noted, five specimens of this showy little beetle

were picked up on the ground in the meadow. Comparison with the species of this genus in the LeConte collection, showed that all but one of my species were marked almost exactly like the specimens labelled *bipustulatus* Fab., but in every specimen the hind angles of the prothorax were depressed in a manner similar to that of the types of *pulchellus*. My specimens show that the extent of the black markings is variable and indicate that a larger number of specimens will give a complete series of colour intergrades. We shall then have but comparative extent and depth of the depressions of the hind angles of the prothorax for the specific difference (Bull. Brooklyn Ent. Soc. vol. V, p. 7) I have not examined the two species for other differences, but the character above given is very slight in the specimens seen.

Necrophorus vespilloides Hbst. Two specimens of this species were taken on a dead woodchuck in the deep woods at Wales, June 15, 1909, and another specimen from the same locality bears the date of July 10, 1913.

Listotrophus cingulatus Grav. Some time was spent at Monmouth watching this species to find the reason for their immediate appearance on fresh cow dung. I soon found that they were stalking the green flies that infested the manure in numbers. Several of the beetles were observed with flies in their jaws, but the exact manner in which they were seized was not seen. The beetles evidently came upon them around the edges of the pile or cornered them in folds and pockets of the mass. They have also been seen feeding on adult *Aphodius fimetarius*.

Phymaphora pulchella Newm. Four specimens were found at Monmouth, June 27, 1912, beneath the ragged bark of a dead basswood (linden) tree. In identifying this rare catch it was noted that figure 199 on page 537 of Blatchley's Coleoptera of Indiana is a fair representation of *Mycetina perpulchra* Newm. and not of *P. pulchella* Newm. as stated in the text.

Cryptorhopalum hæmorrhoidale Lec. This species has been taken rarely on Spiræa flowers in Maine. Three were taken somewhere within the limits of the town of Turner on July 14, 1914, by the labour-saving method of sticking the net out of the automobile as we rode along the narrow shrub-fringed road.

Ips confluentus Say. The necessity of using care in passing by supposedly familiar insects was well illustrated when I recently examined a bottle of alcoholic specimens taken at South Paris, July 10, 1914, and found my first specimen of this species. I had carelessly scraped it out of the pitch on the end of a log in the mill yard for *I. sanguinolentus*, but with a vague feeling that there was something unfamiliar about it. I wonder how many rarities I have discarded!

Georyssus pusillus Lec. Three specimens were taken on a sand bar in the Little Androscoggin River at South Paris, June 17, 1912.

Limnichus punctatus Lec. On June 15, 1907, while I was sitting by a spring in Wales trying to reduce my temperature and satisfy my thirst by keeping at the saturation point, I noticed many of these small insects very slowly moving about on the sandy mud along the tiny stream that ran from the spring. I captured all in sight and started out more by throwing water on the bare places.

Tharops ruficornis Say. On June 23, 1910, two were taken by beating at Monmouth, and on the 25th I found a few more resting on the ends of beech sticks in piles of cordwood in a forest clearing at Wales.

Alaus myops Fab. This species has been taken a number of times on logs at Paris and Monmouth, while at the latter place it was once found feeding on the sap that oozed from a red oak stump. Several years ago I took a couple of Alaus larvæ under the bark of a white pine stump at Monmouth about June 25. The larger one was two and one-half inches long and apparently full grown. They were put into a box with twenty or thirty large ant larvæ and half a dozen *Elater* larvæ, and at the end of three days only the large larva remained. A second lot of larvæ disappeared in the next two days, and the surviving *Alaus* was brought to Framingham, Mass. At odd times during the fall more larvæ were put in the box which was a tin one about ten inches high and four by eight inches in the other dimensions; it was more than half full of dirt, rotten wood, and mould. On October 7th the larva was

found to be covered with small yellowish-white mites, and they were carefully scraped off with a sharp knife. As a reward I received a bite on the finger that penetrated the skin deep enough to bring the blood. On August 25, more than a year after the capture, I found in the box a very lively *Alaus myops* that measured 39 millimeters. From the same box there appeared *Coscinoptera dominicana* and *Pogonocherus mixtus*, two fortunate individuals that had escaped the maw of the savage *Alaus*. It seems to me that the larva of this insect is generally carnivorous instead of lignivorous as has been often stated. The flattened head and prominent mandibles are well fitted for searching out and seizing larvae beneath the bark of dead and dying trees, or stumps from which the bark has become loosened.

Melanotus leonardi Lec. A number of specimens of this were taken at Paris, June 15, 1910, on raspberry bushes that fringed the bare, ledgy summit of a hill.

Corymbites vernalis Hentz. Five or six specimens of this were taken at Wales, June 16, 1907, on the flowers of the black cherry (*Prunus serotina*) and on June 12, 1909, a few more were taken flying about a clump of *Prunus virginiana* near the same locality.

Corymbites fallax Say. The only specimens I have ever seen were the two that were beaten from small paper birch trees near the summit of a hill at Paris, June 15, 1910.

Hypnoidus melsheimeri Horn, a variety of *pectoralis* Say, *exiguus* Rand., and *striatulus* Lec. (?) were all taken on July 9, 1914, at the old fording place on the Little Androscoggin River at South Paris. They were discovered by turning over the stones that were half imbedded in the sandy soil and pulling up the bunches of grass that grew among them. I do not think they were beneath the stones but around the edges, from whence they were dislodged into the cavity. All the specimens were found in one spot a few feet in diameter and I could not find them anywhere else on the beach, even in spots that appeared exactly the same.

The noon sun had poured down its rays upon this spot and the high banks and wooded shores had guarded it from every

breeze until the stones were uncomfortably hot, but it was evidently a place of interest to these pretty little elaters. They exhibited surprising activity coupled with the ability to disappear as if by magic, even snapping themselves out of sight from the wetted finger before it could be placed over the alcohol bottle, while attempts at picking them up with the fingers or tweezers resulted mainly in pinches of sand. By drenching the spot with water they become less lively but also less conspicuous. A single specimen of the variety of *pectoralis* was later swept from some weeds. In 1913 I took *exiguus* in numbers a few feet from this spot, under the same circumstances.

Limonius aurifer Lec. This elegant little creature was taken once by beating maple sprouts in a forest clearing in Wales, June 24, 1910.

Drapetes geminatus Say. One specimen was swept from *Alnus incana* at Wales, July 9, 1913, and two more were taken at Monmouth, July 14, and 17, 1914, in a cut over woodland full of slash and raspberry bushes. One of these two was swept from raspberry bushes and the other was crawling on a dead maple stub.

Chrysobothris blanchardi Horn. At Paris (July 12 to 19, 1913) I took a number of this species on pine logs in the mill yard and on the trunks of the white pines growing near the lumber piles. I though they were *trinervia* until my returning home, when I found they were the first series of *blanchardi* I had ever taken. One specimen was taken in the same place on July 16, 1914.

Agrilus politus Say. Several specimens of a dark purple-cupreous were taken on Corylus leaves at Paris on July 9, 1914. These are of the same colour variety as specimens taken on Corylus in Mass., June 22, 1913, and June 21, 1914.

Agrilus arcuatus Say. A single specimen of this was taken at the same time and place as the preceding species. This variety was called *coryli* by Dr. Horn in his "Species of Agrilus of Boreal America" page 297, and there seems to have been no description of it other than these few words: "Var. *coryli* Horn.—Colour uniformly bright brassy." The colour varies from a bright brassy-cupreous to a dark purple-cupreous, and so closely do these colour forms resemble those of *politus* that a careful examination

of the sculpture, thorax, or claws is necessary to separate them. Both species were taken on the same patch of *Corylus* at Sherborn, Mass., and for some time remained mixed in my boxes as *arcuatus*. It would seem from this and from other facts at hand that the food plant has much to do with the variations in colour that are exhibited by this interesting genus.

Collops tricolor Say. Several specimens were taken at Paris, June 14, 1910, running about on the sun-scorched ledge at the summit of a hill of perhaps a thousand feet elevation.

Ptinus bicinctus Sturm. A number of dead specimens of this species were taken by sifting the debris from the grain bin and the barrels and boxes in the corn house at Wales, about July 1, 1905. I also noticed that many of the numerous pellets of rat dung were perforated with a neat hole in the side and contained a whitish, hairy larva. A few specimens were bred, but most of the material was sent to Prof. H. C. Fall who determined the species for me.

Ptilinus ruficornis Say, has been taken quite commonly at Monmouth, June 21 to 25 on several years, and at Wales it was found boring into beech wood June 25, 1910. In my series there are three males and twelve females, which shows the relative abundance of the sexes.

Odontosphindus denticollis Lec. Three were taken on the top of an oak stump in a species of flattened fungus, June 27, 1912.

Trox scaber Linn. At Monmouth on November 28, 1907, I found a large number of adults under an old blanket which had evidently been lying for some years beside a cart road.

Serica tristis Lec. This species has been very common on *Alnus incana*, at Monmouth June 21, 1910, at Wales June 26, 1909, at Paris June 19, 1912, and was taken at Fabyans, N. H. July 4, 1914. It has been seen eating the petals of blackberry flowers.

Aphonus tridentata Say. I have always been puzzled to account for finding dead specimens of this species on well-travelled roadsides, in beaten paths, and in sand pits. The specimens are generally spread out with no indications that they have been killed by birds or insects, and many times in perfect condition.

I have found but one live specimen. The earliest date is June 13 at Paris, and the latest August 2, at Wales.

Euphoria fulgida Fab. Two specimens were taken at sap on a red oak stump at Monmouth June 29, 1912. One of these was decorated with a number of spots resembling whitewash on the disk of the elytra, and a single spot on each side near the margin. This is the only one I have ever taken with white markings. I once saw a number of these beautiful insects flying about me while surveying. They were attracted to the brass mountings of the level on which the sun was shining. Near me was a corn field in which the farmer had hung pieces of tin to scare off the crows, and perhaps these shining, swaying bits of metal had first attracted them to the locality.

Physocnemum brevilineum Say. About the 16th of July, 1913, I was pleased to discover that these graceful little creatures were visiting the elms in the village of South Paris, and from noon until nearly 5 p.m., while the sun was shining, I replenished my meagre supply. They did not favour trees under two feet in diameter, and were found low down on the trunks running in and out of the crevices and folds of the bark much resembling huge ants. On the disappearance of the sun beneath a cloud they secreted themselves, and when frightened dropped to the ground and attempted to hide. When the sun was very hot they sometimes escaped by flying. In 1914 they were found from July 12 to 16; and apparently the maximum abundance extends over a very short period.

Xylotrechus quadrimaculatus Hald. The first and only specimen I have ever taken was found on a pile of lumber at Monmouth, June 29, 1912, and appeared to be freshly emerged. This speci-, men is of a reddish-brown colour, and I have another from Orono, July 14, 1906, which is a light testaceous grey.

Calloides nobilis Say. I was greatly surprised to find five specimens of this fine beetle at sap on an oak stump at Monmouth, June 29, 1912.

Monohammus confusor Kirby. I have taken this species twice at Monmouth.

Monohammus marmorator Rand. A single specimen has been sent me from Wales, but I have not yet been able to find it myself.

Plagionotus speciosus Say. For thirteen years I have looked in vain for this species on the infested maples at Monmouth, and during this time I have received but two, both dismantled wrecks, from friends there. One year a friend cheerfully informed me that he had collected seventeen and was keeping them alive in a jar for me when his wife let them all out a few days before my arrival because it was "too cruel to keep the poor things shut up like that." On July 9, 1914, at South Paris I took my first specimen, and for a week I made regular trips two or three times a day from tree to tree around the village I acquired fourteen specimens and a desire for more, besides arousing the curiosity of all the villagers. It is remarkable how inconspicuous these large and highly coloured beetles are unless directly in the sun and low down on the tree. They are slow moving and I lost but one specimen seen, which escaped by flight from the ground while I was trying to dislodge a second one from a high limb by throwing my net at it.

Leptura nigrella Lec. The first specimen of this sombre insect I ever saw was a female which was taken in the mill yard at Monmouth, June 28, 1912. It was taken by a lucky swing of the net while in the air after an awkward leap from a pile of logs. When I had examined my catch I felt more than repaid for the shaking up of the undignified landing. A male was taken on a maple stub in a small clearing on July 17, 1914.

Leptura biforis Newm. A single specimen was taken on flowers at Monmouth, August 29, 1902.

Hoplosia nubila Lec. One specimen was taken on a log in the mill yard at Paris, July 12, 1913.

Oberea pallida Casey. This species has been beaten from *Alnus incana* in considerable numbers, both at Wales and Monmouth, on several occasions. The dates range from June 19 to the 29, and a single specimen was taken at Paris on July 10, 1910. This species seems to be abundantly distinct from any other *Oberea* and can be readily distinguished by the uniform colour of the entire insect, even the black callous spots of the pronotum become, in some cases, (not a sexual character as indicated in the description) nearly concolorous with the rest of the disk.

Donacia cincticornis Newm. A so-called variety of this species is found on the leaves of the yellow pond lily (Nuphar) in the coves of the lake at Monmouth, and it is also the common species of the lilies in the sluggish, winding streams of the meadow lands. It is a broad, depressed insect of a dark, violet-blue colour. They fly from one lily leaf to another when disturbed, keeping so close to the water that they are very hard to net; they also delay the start until the net has passed over them. In the open lake, if the boat is allowed to drift broadside across a patch of lilies when the waves are high, one can see this species shining like balls of quicksilver as they cling to the submerged pads, sometimes a foot beneath the water.

Donacia subtilis Kunze. This species is less common but is found in the sheltered coves of the lakes resting on the stems of the water grasses. I have taken them in the hand by leaning over the bow of the boat. Dates are June 21 to 25.

Donacia palmata Oliv. A very few specimens of this species have been taken at Monmouth, June 21 to 29.

Donacia torosa Lec. A series of a supposedly undescribed species which was swept from the grass of a wet meadow at Wales has turned out to be typical specimens of this form. It has been supposed to be a variety of *distincta*, but I think it will finally be given full rank. It is of a uniform dark blue or, as given in the description, blackish-violet colour. Dates are June 16, 1907, and June 13, 1909.

Haltica bimarginata Say. This well-known species appeared in such numbers on a small area of *Alnus* sprouts at Monmouth that I was curious to know how many could be taken. I selected two bunches of the bushes about three feet high, and swept them with six strokes of the net. In bottling the catch several escaped, but there remained 596 individuals. This does not quite equal the record of 600 odd specimens of *Phyllotreta sinuata* which were taken at one sweep from a bunch of *Cruciferæ* at Framingham, Mass.

Eupsalis minuta Drury. One specimen of this species was taken on a red oak log in the mill yard, and a pair of them was once found industriously boring holes in a log of the same kind in the deep woods at Wales, July 23, 1908.

SOME CALIFORNIA BEES.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

THE BEES RECORDED BELOW WERE RECEIVED FROM POMONA COLLEGE, CALIFORNIA.

Perdita (*Cockerellia*) **aureovittata,** n. sp.

♀.—Length 8 mm.; robust, with dull white hair; head broad, dark bluish green, eyes slightly diverging below; mandibles bidentate, reddish in middle, pale yellow on upper side basally; labial palpi with first joint about 770 microns long, and last three together about 448; maxillary palpi slender, last joint orange, joints measuring in microns, approximately, (1) 192, (2) 160, (3) 144, (4) 96, (5) 96, (6) 104; clypeus piceous, sparsely punctured, with a large, pale yellow spot on each side, but none in middle; no supraclypeal mark; lateral face-marks pale yellow, consisting of rather small triangular patches at lower corners of face; flagellum light ferruginous beneath; mesothorax very minutely punctured, green in front and around margins, but black on disc; scutellum black, with fine punctures; rest of thorax dark blue-green; prothorax without yellow markings; legs dark brown, the anterior femora with a small yellow spot at apex; middle femora sharply keeled beneath; tegulæ pale testaceous; wings hyaline, nervures and stigma light ferruginous; b. n. falling far short of t. m.; marginal cell very oblique at end, so much so that it could be described as pointed; abdomen with five very broad, entire, bright orange bands, those on segments 2–4 notched anteriorly in middle, and all more or less excavated behind sublaterally; hair at apex pallid, with a brownish tint; venter dark brown.

Hab.—Claremont, California (*Baker*). Pomona coll. 226. Related to *P. sparsa* and *P. albipennis*, but readily known by the face-markings, broad, orange abdominal bands, etc.

Zacosmia maculata (Cresson).

Claremont (Baker); Pomona coll. 163. This is the true *Z. maculata*; a male which I collected at Juarez (Chihuahua), Mexico, May 12, may be taken as typical of a new subspecies *desertorum*.

It is rather small, with the light hair very pale; mesothorax more closely punctured, the brown marks on its anterior part faint and suffused; dark marks of abdomen paler, the spots dilute brownish, evanescent posteriorly; second segment with a black dagger-like mark in middle, but the dark basal area so reduced as to be almost entirely overlapped by the first segment.

Tniepeolus pomonalis, n. sp.

♂.—Black, with the usual markings on thorax and abdomen warm ochreous, the band on sixth abdominal segment creamy-white; legs, antennæ and tegulæ black. Length about 12 mm.; robust. Superficially, this looks almost exactly like *E. remigatus* Fabricius, from Virginia, but it differs as follows: mesothorax anteriorly with two well-developed longitudinal bands, longer than in *remigatus* (these joined, as in *remigatus*, with the band surrounding mesothorax except in middle of front); median black area on first segment pointed at sides; apical plate of abdomen much larger; insect distinctly more robust. There is also a close resemblance to *T. concolor* Rob., from Illinois, but *T. pomonalis* differs thus: clypeus with no median ridge; light hair of face limited to a certain amount on clypeus and lower part of supraclypeal area, and a large band on each side of antennæ; bare part of pleura very densely punctured all over; a continuous hair-band all round mesothorax except in anterior middle; black area on first abdominal segment not sharply limited at sides; abdominal bands much broader; apical plate much larger. From *T. texanus* var. *nigripes* it is known by the clypeus, which is densely minutely punctured, and has scattered larger punctures, which are shallow. *T. superbus* (Provancher), described from Los Angeles, I have never seen, but *T. pomonalis* differs from the description in being larger, with no spot on tegulæ, stripes on mesothorax too large to be described as "two little lines," and no spots at sides of metathorax. The middle of the abdomen beneath has two silvery-white bands close together, the first with more than the middle third missing; on outer face of middle tibiæ anteriorly is a small band of orange-fulvous glittering hair; the wings are very dark; there is pale hair along the border of metathoracic enclosure.

Hab.—Claremont, California, (*Baker*). Pomona coll. 160. The mesothoracic bands or stripes distinguish this from *T. nigriceps* Smith, and the marking of the first abdominal segment is different, though that of the second agrees with *nigriceps*.

Nomia arizonensis angelesia Ckll.

Claremont (*Baker*). Pomona coll. 196.

Andrena plumifera, n. sp.

♀.—Length about 10 mm.; rather robust, black; head and thorax with abundant ochraceous hair, pallid on face, cheeks and under side of thorax, becoming fulvous on thorax above; facial quadrangle broader than long; process of labrum broadly rounded; clypeus entirely dull, hairy, the minute punctures forming transverse lines, no median ridge; facial foveæ broad, ochreous, extending below level of antennæ, the lower end not sharply defined; third antennal joint 416 microns long, 4 and 5 together 365, 4 to 6 together 560; flagellum very obscurely brownish beneath; mesothorax and scutellum dull and granular; area of metathorax small, rather conspicuously rugose; tegulæ piceous with a rufous spot; wings greyish; stigma dark reddish, slender, lanceolate, not over half diameter of marginal cell; b. n. meeting t. c.; second s. m. receiving first r. n. a little beyond middle; third s. m. very long; legs black, with pale hair, brown on middle and hind knees; middle and hind basitarsi broad; scopæ of hind tibiæ ample, dense, strongly plumose (collecting pale yellow pollen); abdomen somewhat shining, with a microscopically reticulate surface and excessively minute punctures; segments 2 to 4 with broad, dense white hair-bands, that on 2 broadly and abruptly interrupted in middle; apex with very pale purplish-grey hair, almost a lilac shade.

Hab.—Claremont, California (*Baker*; Pomona coll. 199). A species of the subgenus *Pterandrena*, running in Viereck's key (Canad. Entom., 1904, p. 227) to *A. nudimediocornis* Vier., which differs by the distinctly punctured dorsulum. Superficially, it looks exactly like *A. bridwelli* Ckll., but the surface of the abdomen is entirely different. It is smaller than *A. pecosana* Ckll., with the clypeus quite different.

A REMARKABLE NEW SPECIES OF PHORA (*TRINEURA*).

BY CHARLES T. BRUES, BUSSEY INSTITUTION, HARVARD UNIVERSITY.

The genus Phora, more generally known under the name of Trineura, includes a small number of species of velvety black colour. Quite recently Prof. J. M. Aldrich received from Manitoba a series of specimens which he at once recognized as an undescribed species. Instead of the velvety black colour so characteristic of the other members of the genus, the mesonotum of the male is satiny blue-green, while the remainder of the body exhibits a less distinct tinge of the same colour. Structurally, the species departs in no striking way from its congeners.

On account of its peculiar appearance he suggested that I describe it at the present time.

Phora (=*Trineura*) **viridinota**, sp. nov.

Male.—Length 1.5 mm. Black; mesonotum and scutellum blue-green and opaque; abdomen almost black, but slightly tinged with greenish; front greyish green; knees of four anterior legs and front tibiæ and tarsi brownish testaceous; wings hyaline, costal vein black, first and third veins dilute piceous. Front slightly more than twice as high as broad, its bristles large and strong except the lowest pair, which are half the size of the others. Ocelli in an equilateral triangle, the posterior ones as far from one another as from the eye-margin. Antennæ small, oval, with bare arista. Palpi very small, half as long as the antennæ, with stout, closely placed, although small, bristles. Postocular cilia enlarged below. Mesonotum sparsely clothed with bristly hairs; with a single pair of very prominent dorsocentral macrochætæ in front of the lateral angles of the scutellum. Scutellum subtriangular, nearly as wide as long, with one pair of stout bristles and a very weak pair anterior to the stout ones. Propleura bristly along the entire posterior edge, the bristles larger near the coxa; mesopleura bare. Abdomen with the second and sixth segments elongated, the sixth most noticeably so. Hypopygium, when viewed from the side, with the median plate extending posteriorly into a finger-like projection which is longer than in *P. aterrima*. Anterior legs with the tarsi not wider than the tibiæ; metatarsus one-third as long as the tibia; second tarsal joint a little widened, less than half as broad as long; third twice, and fourth nearly twice as long

as broad. Middle tibiæ with five or six long bristles along the basal two-thirds of the outer edge and a single bristle at the basal third on the anterior surface; longer spur two-thirds as long as the metatarsus. Hind tibia with a single bristle on the anterior surface at the basal two-fifths and a short one just before the apex; longer spur scarcely longer than the width of the metatarsus. Wings with the costal vein reaching to the middle, its bristles rather long and sparse, about 17 in each series, and each bristle about as long as the greatest distance from the costa to the first vein; first vein bending sharply and then slanting to the costa, its apex nearer to the tip of the costa than to the humeral cross-vein; fourth vein weakly curved on its basal half, straight beyond, ending barely before the wing tip; fifth and sixth weak, nearly straight; seventh obsolete. Halteres black.

Female.—The front is broader, and the body is black, with only the slightest tinge of the green colour of the male. The front tarsi are more distinctly thickened, the second and following joints being slightly wider than the tibia; second joint distinctly less than twice as wide as long; third one-third longer than wide.

Described from four specimens; type ♂, two ♂ paratypes and one ♀ paratype. Treesbank, Manitoba, Canada, (N. Criddle) May 30. Type in the collection of the Entomological Branch, Dept. of Agriculture, Ottawa.

As Professor Aldrich remarked in his letter sent with the specimens, this is the only Phorid which shows a distinct green colour, the other members of the family being black, brown, reddish or yellow of various shades and combinations. Only one other form with which I am familiar, *Melaloncha pulchella* Brues, departs from this type of coloration, the abdomen having bands of bluish pruinosity.

BOOK REVIEW.

RHYNCOPHORA OR WEEVILS OF NORTHEASTERN AMERICA. BY W. S. BLATCHLEY AND C. W. LENG. THE NATURE PUBLISHING CO., 1558 PARK AVENUE, INDIANAPOLIS, INDIANA, U. S. A.

Those who possess the monumental work of Prof. Blatchley on the Coleoptera of Indiana will rejoice to learn that he has completed his great task by publishing the present volume on the Rhyncophora, which were not included in the former book. By

associating with him Mr. Leng, who had for some time been working on the Weevils of the Atlantic Coast, he has been able to extend the scope of the volume so as to include the United States and Canada, east of the Mississippi River, thus going far beyond the bounds of the State of Indiana, to whose Coleopterous fauna the previous book was confined. The volume contains 682 pages and is illustrated with 155 figures.

In their introduction the authors state that their "primary object has been to furnish to students and tyros in Entomology a simple manual which would enable them in the most direct way possible to arrange, classify and determine the scientific names of the weevils in their collections." In accordance with this design the work begins with an explanation of the external anatomy of these beetles, with clear figures of the various structures. After a careful study of these details the reader will be able to go on and make good use of the book. Four families are recognized, namely, the Brenthidæ, Anthribidæ, Curculionidæ and Scolytidæ; to the third of these over five hundred pages are devoted, and descriptions are given of 856 species distributed among thirteen sub-families.

According to the plan of the work, a general description of each family is given, followed by keys to the genera, which in turn are described and usually illustrated with a characteristic figure, assisting materially in their recognition. After the genus a key is given to the species, followed by descriptions, with an account of their geographical range, habits, dates of capture and other particulars. By a careful use of the keys, a species may be run down and a specimen identified with comparatively little difficulty.

At the end of the volume there is a Bibliography of the works that have been referred to, and Indexes to the Plants affected by weevils, the Families, Sub-families, Tribes and Genera.

We may justly congratulate the authors on the completion of such an excellent work, which must have involved a very large amount of most painstaking labour. The book will be eagerly welcomed by all entomologists who are interested in this division of the Coleoptera, and should render more popular the collection and study of the Rhyncophora now that facilities for doing so are admirably supplied. C. J. S. B.

Mailed November 14th.

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The Plum Curculio (*Conotrachelus nenuphar*). See page 400.

The Canadian Entomologist.

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POPULAR AND PRACTICAL ENTOMOLOGY.

The Plum Curculio in Ontario, Nature and Extent of the Injuries, Conditions Favoring the Insect, and Means of Control.

Part I— Nature of the Injuries.

by L. caesar, guelph.

The Plum Curculio is found practically all over the fruit-growing portions of Ontario, and is one of our most destructive and, under some circumstances, difficult insects to control. The name "Plum Curculio" is misleading because the insect attacks not only plums but apples, pears, cherries, peaches, apricots, quinces and, on rare occasions, gooseberries. In our experience apricots are worst attacked, then plums and sweet cherries; after these sour cherries, apples, pears, peaches and quinces in the order named. We have only in one locality seen gooseberries attacked.

Kinds of Injuries.—There are several kinds of injuries: First, there is the injury due to egg laying and the accompanying crescent-shaped scar made by the female almost immediately after the act. There may be anywhere from one to a dozen or more eggs, each with its crescent, to a single fruit. If such fruit does not drop prematurely, it is usually either disfigured by the enlargement of the crescent into a brown scar or calloused area, which by its nearly semi-circular shape still shows its origin, or is deformed by a depression caused by the growth being checked at the point of oviposition but being continued all around it. There may be several of these depressed areas, some of them quite deep, on a single fruit. This type of deformity is very common on apples and pears but much more rare on other fruits. Some of the apples and pears are so much misshapen that they are totally unfit for market. Such fruit is often spoken of as being "knobby." The pear has the habit of producing stone cells at the injured places.

These spots become so hard and gritty that they are likely to break one's teeth if an attempt is made to bite through them.

The second injury is caused by the early feeding habits of the first generation of beetles, that is the over-wintered beetles. Both males and females during the egg-laying season feed upon the fruit, eating out little holes of about 1-24th of an inch or a little more in diameter. In our observations these feeding punctures were not nearly so numerous as the crescent-shaped cuts, but several investigators have found them quite as numerous. These punctures, too, seem to lead to the same kind of deformities in apples and pears as we have described above.

The third injury is the dropping of most of the infested fruit. If the larva, or grub, that hatches from the egg lives, practically all kinds of fruit except cherries drop prematurely. Fortunately not only does a very large percentage of the eggs fail to hatch, but also a great many of the larvæ themselves die in the fruit soon after hatching, so that these two things lessen the total amount of dropping. Premature falling of fruit extends over a period of more than a month, but most of it takes place before the apples are more than about one inch in diameter. On some trees sprayed for Codling Moth we found over 90% of all the early drops were due to the Curculio. When the fallen fruit was cut through, it was seen that the grubs by the time they were mature had eaten large areas inside, as large and as unsightly in many cases as those caused by the Codling Moth larvæ. The infested cherries, which, as has been said, remain on the trees, usually become sunken and darkened on one side, thereby clearly revealing the work of the insect. Cherries containing the Cherry Fruit-fly larvæ do not always have some outward manifestation of the presence of an insect.

A fourth injury is caused by the late summer and autumn feeding of the new generation of beetles. This injury is common on apples and peaches, but rare on other fruits. On the apple the beetle eats a small, round hole through the skin, and then inserts its long proboscis and excavates the flesh as far as it can reach. The result is a small, circular, brown area on the surface with a hole in the centre and a cavity beneath. Sometimes the beetles work

their way through the skin and enlarge the cavity until it is nearly quarter of an inch in depth and about the same in breadth. Not infrequently, if this hole is on the sunny side of the apple, its borders for some distance out will be reddened by the sun and thus the injury rendered very conspicuous. Many fruit-growers mistake such injuries for the side work of the Codling Moth, but the distinction between the two is easy to make, because the Codling Moth goes right into the core, while this injury is seldom more than quarter of an inch deep. There are often many of these injuries in a single fruit; for instance, I have counted as many as forty on one apple. In such cases several injuries usually coalesce and make a much disfigured fruit. In the writer's experience, rough-skinned varieties seem to be more subject to attack than very smooth or glossy ones, possibly because the former afford a firmer foothold for the beetles when feeding.

Peaches are also sometimes quite severely marred by this fall feeding. A peach that lies on my desk as I write has eighty curculio scars on it, all made by the new generation of beetles during August and September. From half of these, including all the larger and deeper ones, gum is exuding. The appearance of the injuries on the peach and apple differs in that on the peach the beetles usually remove all of the skin above the cavity which they excavate; the injured area, too, is often quite irregular in outline, and seldom goes so deep as in the apple. In the apples the skin, as we have stated, usually covers the excavation except for the small hole in the centre where the beak is inserted, and the injured area is usually uniformly circular in outline.

A fifth injury is brought about by the wounds made by the beetles, both in the earlier and later parts of the season, in plums, cherries and peaches affording exposed areas for the introduction of the spores of the Brown Rot disease. The skin of fruits ordinarily serves to a very great extent as a protection against the introduction of disease, but, if the skin be ruptured, the spores, which are carried by the wind everywhere through the orchard, have a good chance to light on the moist surface and germinate before a callous can be formed by the fruit over the wound to protect it.

EXPLANATION OF PLATE XI.

Fig. 1. a. a. a. Small lumps of earth showing the pupæ in their little oval chambers; b. a dark circular area in the lump showing the empty chamber after the pupa has been removed; c. an adult beetle after transforming and still in the pupal chamber; d. d. d. d. adult beetles—all natural size.

Fig. 2.—Apple showing the crescent-shaped cuts made by the females after laying eggs—natural size.

Fig. 3.—Full grown larvæ and their work in a fallen apple—natural size.

Fig. 4.—Fall or late summer injuries on apple made by the feeding of the new generation of beetles. These injuries though natural size are larger than the average.

Fig. 5.—Fall or late summer injuries made on peach by the feeding of the new generation of beetles—natural size.

(To be continued.)

NEW INDIAN GALL MIDGES.

BY E. P. FELT, ALBANY, N. Y.

Below are characterized some exceptionally interesting new species and genera occurring in a small collection recently submitted for study by Prof. T. Bainbrigge Fletcher, Imperial Entomologist, Agricultural Research Institute, Pusa, Bihar, India.

Colpodia fletcheri, n. sp.

The midge described below is provisionally referred to this genus because the sum total of the characters would suggest this group rather than another, though the cross-vein is almost parallel with costa, and there is an approach to a condition found in the genus Didactylomyia Felt. The specimen was labeled "Pusa, Bihar, India, U. Bahadur, January 1, 1916." It is easily distinguished by the peculiar, foliate, curved production of the terminal clasp segment and the tri-lobed, foliate apex of the harpes.

Male.—Length 1.25 mm. Antennæ one-half longer than the

body, rather thickly haired; 15 segments, the fifth with a whitish transparent stem twice the length of the blackish subcylindric basal enlargement, the latter with a well marked, low circumfilum at the basal third and a moderately thick subapical whorl with long, stout setæ; terminal segment slightly produced, with a length a little over twice its diameter, the apex broadly and irregularly rounded. Palpi: first segment irregular, quadrate, the second a little longer, the third twice the length of the second, more slender, and the fourth a little longer than the third. Mesonotum fuscous yellowish. Scutellum reddish yellow, postscutellum reddish. Abdomen rather thickly haired, reddish brown. Wings long, slender as in Colpodia, the cross-vein nearly parallel with costa, the fifth vein uniting with the posterior margin at the distal third, its branch at the basal third; halteres yellowish transparent. Coxæ fuscous yellowish. Legs mostly dark straw, the three distal tarsal segments of the hind legs yellowish white; claws moderately long, strongly curved, unidentate, the pulvilli about half the length of the claws. Genitalia; basal clasp segment short, very broad, quadrate, with an irregular, fingerlike, heavily chitinized process at the internal distal angle; terminal clasp segment broad at base, tapering and curving irregularly to a slender, curved, somewhat foliate apex; dorsal and ventral plates indistinct. Harpes greatly produced, heavily chitinized, the distal free half tapering slightly to an irregularly expanded, tri-lobed, foliate appendage. Type Cecid. 1696.

Harpomyia, n. gen.

This genus was erected for a species belonging in the Dasyneura series having 12 antennal segments and may be most easily recognized by the greatly produced, somewhat sickle-shaped harpes of the male. These organs have a length greater than the entire hypopygium and extend posteriorly like a pair of scissor blades. Type *H. indica*, n. sp.

Harpomyia indica, n. sp.

The midges described below were labeled as having been reared from larvæ found under the lining of a felt cap, August 19, 1915, U. Bahadur.

Male.—Length 1 mm. Antennæ nearly as long as the body, thickly haired, yellowish brown; 12 segments, the fifth with a stem

one-half the length of the subcylindric basal enlargement, which latter has a length about three-fourths greater than its diameter, sub-basal and apical circumfili and subapically a moderately thick whorl of long, moderately stout setæ; terminal segment slightly produced, narrowly conical, with a length about three times its diameter. Palpi: first segment short, subquadrate, the second with a length three times its width, moderately broad, the third one-half longer than the second, more slender, and the fourth one-half longer than the third, more slender, the distal three sparsely haired. Eyes large, holoptic. Mesonotum pale yellowish brown, the submedian lines bright yellowish. Scutellum dark brown, postscutellum yellowish brown. Abdomen yellowish transparent, the genitalia relatively very large and subdorsal. Wings hyaline, subcosta uniting with the narrowly scaled costa near the basal third, the third vein a little before the apex; the fifth vein, indistinct distally, unites with the posterior margin near the distal third, its branch near the basal half; halteres whitish transparent. Coxæ, femora, tibiæ and the two basal tarsal segments mostly whitish or whitish transparent, the three distal tarsal segments dark brown; claws long, slender, moderately curved, unidentate, the pulvilli about three-fourths the length of the claws. Genitalia: basal clasp segment short, stout, curved, the sides nearly parallel, the apex roundly emarginate, the distal angles produced, the internal being longer and broader; dorsal and ventral plates indistinct, the harpes produced as two long, slender, chitinized, somewhat sickle-shaped pieces having a length greater than the entire hypopygium and extending posteriorly somewhat like a pair of scissors.

Female.—Length 1 mm. Antennæ extending to the base of the abdomen, rather thickly haired, yellowish brown; probably 12 segments, the fifth subsessile, broadly subconical, with a length about one-half greater than its diameter; low circumfili at the basal third and apically, a sparse basal and a scattering subapical whorl of long setæ; terminal segment reduced, broadly conical and tapering to a broadly rounded apex. Palpi; first segment with a length three times its diameter, the second a little longer, broader, the third twice the length of the second, more slender and the fourth one-fourth longer than the third, all sparsely haired. Eyes holoptic,

purplish brown. Ovipositor short, stout, the terminal lobes narrowly oval, with a length three times the width and sparsely setose. Other characters practically as in the male.

Pupa.—Length .9 mm., moderately stout, probably yellowish, the antennal cases extending nearly to the base of the abdomen, the wing cases to the third abdominal segment, and the posterior leg cases almost to the tip of the abdomen; the thoracic horns long, filamentaceous, the posterior extremity with submedian, conical processes.

Larva.—Length 2 mm., moderately slender; extremities, anterior conical, posterior broadly rounded, the head and breast-bone not recognizable in the preparation.

Egg Shell.—Length .5 mm., narrowly oval, the surface with numerous minute, hexagonal thickenings, the latter with minute spines arising mostly in or near the angles.

The large size of the egg shell suggests that the females of this species, like Miastor, produce comparatively few eggs.

Indodiplosis, n. gen.

This genus approaches Erosomyia Felt, in the greatly produced and broadly rounded posterior area of the wings, and is readily distinguished therefrom by all of the claws being unidentate, a feature unique so far as known to us, among the sub-tribe bifili. Type *I. mangiferæ,* n. sp.

Indodiplosis mangiferæ, n. sp.

Gall midges were labeled "March 23, 1914, in galls of Mango leaf. Pusa, A. H. C., No. 1023." A female, presumably conspecific, was received from the same source and labeled "C. No. 100, Mango leaves, Pusa, Bihar, T. Ram, September 26, 1915." These dates would indicate the possibility of there being two generations annually, though the appearance of the female may have been erratic and induced by abnormal conditions.

Male.—Length .75 mm. Antennæ nearly twice the length of the body, thickly haired, light brown; 14 segments, the fifth with the stems equal and one-fourth greater than their diameters respectively; basal enlargement subhemispheric, the distal enlargement subglobose, each with a sparse whorl of long, stout setæ and moderate circumfili, the loops, about eight in number, being

moderately stout and extending nearly to the base of the next enlargement. Palpi: the first segment slender, irregular, second narrowly oval, with a length about twice its diameter, the third a little longer and more slender than the second, the fourth one-half longer than the third, more slender. Mesonotum reddish brown. Scutellum and postscutellum yellowish. Abdomen rather thickly haired, brownish yellow, the genitalia darker. Wings hyaline, subcosta uniting with the margin near the basal third, and with the inclosed cell clouded with a chitinous thickening, the third vein nearly straight, joining the margin at the apex of the wing, the fifth indistinct distally, uniting with the posterior margin at the distal third, its branch at the basal third; halteres pale yellowish. Legs mostly dark straw; claws long, slender, unidentate, the pulvilli nearly as long as the claws. Genitalia: basal clasp segment long, slender, with a rather distinct internal, quadrate lobe basally; terminal clasp segment somewhat swollen at the base, irregular and tapering to an obtuse, spurred apex; dorsal plate short, broad, broadly and triangularly emarginate, the lobes narrowly rounded and sparsely setose; ventral plate moderately long, broad, deeply and narrowly and triangularly emarginate, the lobes rather broad and tapering slightly to a narrowly rounded, setose apex; style long, stout, narrowly rounded apically. Type Cecid. 1686.

Exuvium.—Length 1.5 mm., moderately stout, whitish transparent, the antennal cases with indistinct basal processes internally and extending to the second thoracic segment, the wing cases to the fourth abdominal segment, and the leg cases to the fifth abdominal segment, respectively; the dorsum of the abdominal segment rather thickly and uniformly covered with minute, chitinous forks; posterior extremity broadly rounded, somewhat lobed and incised apically.

Female.—Length 2 mm. Antennæ extending to the third abdominal segment, sparsely haired, dark reddish brown; 14 sessile segments, the fifth with a length one-half greater than its diameter, subcylindric, with a rather thick basal whorl of stout setæ, a scattering subapical whorl of more slender setæ and at the basal third and apically, low, unusually broad circumfili, the distal filum with the loops somewhat elevated and reaching nearly to the base of the following segment; terminal segment somewhat produced and

tapering to an irregular, narrowly rounded apex. Mesonotum dark brown. Scutellum reddish brown, postscutellum yellowish. Abdomen mostly dark red, the wings subhyaline and the wing venation practically as in the above described male and with the costal cell decidedly more obscured; halteres yellowish basally, brownish apically. Coxæ and legs mostly brownish straw. Ovipositor short, up-turned, the terminal lobes subquadrate, with a length one-fourth greater than the width and bearing a few long, slender setæ and numerous shorter ones. Other characters practically as in the above described male. Cecid. 1695.

This sex is provisionally associated with the preceding.

Streptodiplosis, n. gen.

A remarkable male referred to this genus suggests, in the somewhat broad wings, an affinity with Lobopteromyia Felt, from which it is easily separated by the very peculiar genitalia. Type *S. indica*.

Streptodiplosis indica, n. sp.

The one male described below was labeled "number 38, Kusti, Kalan Estate, North Wynaad, South India, February 16, on leaves infested by *Mytilaspis piperis* Green. U. Bahadur." It is probably predaceous upon this scale insect.

Male.—Length .75 mm. Antennæ twice the length of the body, rather thickly haired, pale grayish, the stems whitish transparent; 14 segments, the fifth having stems with a length two and one-half and three and one-half times their diameters, respectively; basal enlargement globose, with a sub-basal whorl of long, stout setæ and a subapical circumfilum, the moderately stout loops extending nearly to the globose distal enlargement, which latter bears similar setæ and loops; terminal segment having the basal enlargement oblate, a stem with a length about three times its diameter and the distal enlargement prolonged, with a length over twice its diameter and tapering at the distal third to an obliquely rounded apex. Palpi apparently quadri-articulate, the first segment small, subquadrate, the second with a length over twice its diameter, the third one-half longer, more slender, and the fourth one-half longer and more slender than the third. Face white. Mesonotum, scutellum, postscutellum and abdomen

yellowish white, the abdomen basally and laterally with an irregular, black marking, possibly due to the body contents. Wings hyaline, broad, with a length hardly twice the width, subcosta uniting with the anterior margin at the basal third, the third vein with its distal fourth curved posteriorly, a little before the apex of the wing, and the fifth vein joining the posterior margins at the distal fourth, its branch at the basal half; the forks of the fifth vein subobsolete and indistinct; halteres whitish transparent. Coxæ pale yellowish; legs mostly a very pale straw; the small claws with a length about half the diameter of the distal tarsal segment, simple, the pulvilli about as long as the claws. Genitalia large, extremely complex, greatly twisted; basal clasp segment long, irregular, swollen basally, slender apically; terminal clasp segment subapical, slender, irregular, the distal third somewhat expanded and thickly and finely setose; dorsal plate long, deeply and triangularly emarginate, the lobes slender, sparsely haired and extending nearly to the apex of the genitalia; ventral plate not recognized, the harpes strongly chitinized, convolute, irregularly S-shaped. Type Cecid. 1693.

SOME BEES FROM MADAGASCAR.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

The following bees were received from the Queensland Museum; I do not know who collected them.

Pachymelus micrelephas Smith.

Miarinarivo, (Queensl. Mus. 9).—*P. sorar* Mocsary is evidently a synonym.

Pachymelus grandidieri n. sp.

♀.—Length 23.5 mm., anterior wing 18; robust, black, with black, fulvous and pale ochraceous hair; tegument of clypeus (which is polished and sparsely punctured, not gibbous in middle), labrum, and greater part of basal half of mandibles orange; mandibles bidentate, and with a subapical fulvous patch; eyes large, brownish red; facial quadrangle longer than broad; scape short, red, with a broad, yellow stripe in front; flagellum ferruginous, becoming chestnut above, third antennal joint very nearly as long as the

next four combined; hair of head entirely fulvous, very bright and abundant on occiput; prothorax with dark seal-brown hair; mesothorax densely punctured, covered with short, black hair, which imperceptibly shades into dark brown anteriorly, the extreme hind margin with a little ochraceous hair; scutellum and metathorax covered with ochraceous hair, fulvous laterally; scutellum dark reddish, bigibbous in middle, the bosses rounded and polished, free from hair; pleura with black hair, except anteriorly below, where it is long and fulvous; tegulæ large and black; wings fuliginous, paler and yellower basally; first r. n. meeting second t. c; b. n. falling far short of t. m.; legs dark red, with rich, fulvous hair; abdomen dullish, with very minute punctures and scattered larger ones; surface appearing black and nearly nude (though with appressed black hair on third segment) as far as middle of fourth segment, but beyond that the abdomen is covered with long, fulvous hair; venter dark reddish, the segments fringed with fulvous hair.

Miarinarivo, (Queensl. Mus. 17). A beautiful species, nearest to *P. heydenii* Sauss., but differing by the lack of fulvous hair on first abdominal segment. It is also appreciably smaller, although it is a female and *heydenii* was described from a male. It is named after the author of the great work on Madagascar, in which Saussure described several species of the same genus.

Crocisa subcontinua Saussure.

Miarinarivo, (Queensl. Mus. 49).—I have also a specimen collected in Madagascar by Hildebrandt.

Anthophora antimena Saussure.

Miarinarivo, (Queensl. Mus. 47).—The specimen, a female, is so grey in tone as to appear almost greenish, and the wings are dusky. Possibly it represents a distinct race, but more material is desirable.

Megachile piliceps Saussure.

Miarinarivo, (Queensl. Mus. 51).—This species (male) is superficially almost exactly like *M. perbrevis* Cress., from Texas.

THE NORTH AMERICAN SPECIES OF *DIBRACHYS* (IN THE NORTH AMERICAN SENSE—*CŒLOPISTHOIDEA* GAHAN) WITH A NOTE ON *URIELLA* ASHMEAD.

BY A. A. GIRAULT, GLENNDALE, MD.

The genus **Dibrachys.**

Antennæ inserted a little above the ventral ends of the eyes but distinctly below the middle of the face. Mandibles 4-dentate. Pedicel longer than funicle 1. Propodeum with little or no neck. Abdomen conic-ovate, pointed. Postmarginal and stigmal veins subequal, short. Segment 2 of abdomen largest, not long.

Propodeum tricarinate. Clypeus somewhat produced, somewhat sinuate at apex, striate.

Spiracular sulcus absent.

Coxæ and femora and the antennæ except the scape, concolorous; funicle joints very short, all wider than long, 1 smallest; second ring-joint twice the size of the first. Postmarginal vein slightly shorter than the stigmal.....*apatelæ* Ashmead. (=*pimplæ* Ashmead.)

Coxæ and the flagellum except much of the pedicel, concolorous; funicle 1 quadrate or somewhat longer than wide, longest, the ring-joints very unequal. Postmarginal vein usually slightly longer than the stigmal; propodeal spiracle reniform. Segment 2 of abdomen only slightly notched at meson caudad as in *apatelæ*. Male antennæ entirely yellow, (compare *boucheanus* Ratzeburg).....*clisiocampæ* Fitch. (=*nigrocyaneus* Norton; =*chionobæ* Howard;= *nematicida* Packard;=*gelechiæ* Webster.)

The same but male flagellum black.....*cladiæ* Gahan.

The species *apatelæ* and *pimplæ* were described as *Arthrolytus*; *clisiocampæ* Fitch as *Semiotellus; nigrocyaneus* Norton as *Cleonymus*; *nematicida*, *chionobæ* and *gelechiæ* as *Pteromalus*; and *cladiæ* as *Cœlopisthoidea.*

Uriella rufipes Ashmead. (Genotype)

Antennæ inserted below the middle of the face but somewhat

above the ventral ends of the eyes, 13-jointed with two ring-joints, the club normal, the pedicel subequal to funicle 1, twice longer than wide at apex. Genal suture distinct. Clypeus sinuate, at the meson with a distinct, sharp tooth; clypeus subglabrous, nonstriate. Caudal tibial spurs distinct, *double*. Venation as in *Pteromalus* but the marginal vein is thickened a little at base. Mandibles 3- and 4-dentate. Otherwise as in *Habrocytus rhodobæni* Ashmead, but the median carina of the propodeum is absent (the lateral distinct), and the spiracular sulcus is only somewhat indicated by a hollow (no true sulcus). Has nothing to do with *Homoporus* or *Phanacra*, and is a miscogasterid of the present Metastenini.

THE OCCURRENCE OF *NEODEROSTENUS* GIRAULT IN NORTH AMERICA (HYMENOPTERA).

BY A. A. GIRAULT, GLENNDALE, MD.

A species from the woods, June 4, 1916. The abdominal petiole in this American species is transverse-linear.

Neoderostenus bipunctatus, new species.

Female.—Length 0.95 mm.

Brassy metallic green, the wings hyaline, the venation dark, the legs and scape (except the middle and caudal coxæ except at extreme apex), white. Head and thorax densely scaly, the scutum scaly-punctate, the scutellum with a compound, 3-foveate puncture at middle between meson and lateral margin (and sometimes with another puncture caudo-mesad of the fir t), somewhat as in the Australian *Achrysocharoides sarcophagus* Girault. Parapsidal furrows at cephalic sixth mere sutures, thence subglabrous, rather broad grooves. Propodeal spiracle minute, round, cephalad (but over its own diameter from the cephalic margin). Propodeum subglabrous. Postmarginal vein no longer than the short stigmal, the marginal fringes of the fore wing very short. Funicle joints subequal, each about twice longer than wide, a third longer than the pedicel which is a little longer than club 1; terminal spine of club distinct. Mandibles 5-dentate, the two outer teeth large, subequal, the inner three subequal, minute.

One female by sweeping, Glenndale, Maryland.

Type.—Catalogue *No. 20314*, U. S. N. M , the female on a tag, the head on a slide.

A NEW GENUS OF OMPHALINE EULAPHID CHALCIS-FLIES FROM MARYLAND.

BY A. A. GIRAULT, GLENNDALE, MD.

Euderomphale, new genus.

Female.—Form of *Chrysocharies*. Head (cephalic aspect) rounded. Antennæ inserted at the clypeus, clavate, 8-jointed, with two large ring-joints and one funicle, the pedicel longer than the funicle and ring-joints combined. Parapsidal furrows complete, much curved, the parapsides ovate. Scutellum simple, much wider than long, short-hemispherical. Propodeum short, noncarinate, the spiracle minute, round, cephalad. Marginal vein subequal to the submarginal, the postmarginal absent, the stigmal rather long, linear. Marginal fringes of the fore wing moderate (a fifth of the greatest wing width). Mandibles acutely, equally bidentate.

Euderomphale fuscipennis, new species. (Genotype.)

Female.—Length 0.90 mm.

Metallic purple, the knees very narrowly and the first three tarsal joints white, the cephalic tibiæ brownish. Fore wings smoky under the whole of the marginal vein, the distal margin of the infuscation oblique but entire. Venation fuscous; base of fore wing more or less smoky. Caudal wing infuscated like the fore wing, with about eight lines of discal cilia where widest (at apex of the marginal vein). Body reticulate, scaly, shining. Scape long, obclavate, the pedicel over twice longer than wide at apex; ring-joint 2 twice the size of 1; funicle cup-shaped, subquadrate, over twice the size of the ring-joints united; club conic-ovate, and with a distinct terminal spine which is nearly as long as the joint which bears it; club as long as the scape or as the flagellum (funicle plus pedicel and the ring-joints).

One female, Glenndale, Maryland; from a neglected meadow, by sweeping, June 22, 1916.

Type.—Catalogue *No. 20349*, U. S. N. M., the specimen on a slide.

THE SHELL-BARK HICKORY MEALY-BUG.

BY A. H. HOLLINGER, UNIVERSITY OF MISSOURI, COLUMBIA, MO.

Pseudococcus jessica, sp. nov.

The writer names this new species of Coccidæ in honour of his wife.

Young Larvæ.—About .5 mm. long when born, and covered with a thin, transparent egg-shell; about .25 mm. wide; oval, broadly rounded at cephalic end and slightly tapering from the fore part of abdominal region to the anal lobes; anal lobes each bearing one short hair; colour: reddish brown on dorsal surface, but orange-brown on the ventral surface, due to the colour of the legs and antennæ; with transmitted light through prepared slides the body appears orange-brown; antennæ six-segmented, bearing numerous hairs; eyes reddish or purplish in colour and situated just behind the peduncles of the antennæ; quite active; body covered with a fine, white, powdery, waxy secretion except at articulation of body segments.

Adult Female.—4 to 6 mm. long; 2 mm. high; 2.5 mm. broad; generally hemispherical in outline, flattened ventrally, and sometimes dorsally when crowded between the bark and wood; colour: purplish blood-red (about the same as that of the woolly aphis—*Schizoneura lanigera*) covered with a relatively thick deposit of white, waxy, secreted powder; *no* lateral fringe of white waxy exudation, nor any hairs, nor secreted waxy, glassy filaments as in certain other mealy-bugs; segmentation of body delineated by thinner secretion of powder wax at those places of articulation; no ovisac is formed, the embryos being laid at caudal end of body under the parent; legs and antennæ reddish brown; when boiled in 10% KOH the bodies of the adults turn deep blue-black and colour the KOH a blood-red.

The *males* have not been observed.

Locality.—Columbia, Mo.

Habits.—It takes the young about fifteen minutes after birth to free themselves from the thin, membraneous egg-shell which envelopes them. They have *no* powdery secretion when they first emerge from the pellicles. The young larvæ have the habit of congregating in masses when not attended by their common "shepherds," the little black ant (unidentified). In their natural

habitat, under the shaggy bark of the shell-bark hickory (*Hickoria ovata*), the ants do not allow them to remain any great length of time where they are born, but are transferred by them to the terminal or lateral twigs of hickory shoots at the base of the tree, or are transferred to similar situations on the old tree itself, where the bark is tender, such as occurs at the junctures of the leaf petioles with the twigs or at any abrasion or crevice in the bark, and here they are guarded and attended by a few of the ants which watch with all the dexterity and aggressiveness they possess. Here they remain until fall, feeding on the sap, and are "herded" by the ants when cold weather sets in, probably being taken into their nests where they hibernate, or possibly some few crawl under the bark and into crevices of the older bark where they pass the winter in these locations. In early spring, as soon as warm weather comes to stay, the larvæ are transferred by the ants to the tree, under the hard protecting bark, where they commence feeding and growing. They apparently become full-grown and mature by about the middle of July in this latitude, for adult females were examined on the 12th July and they were full of embryos. The first larvæ were observed on the 28th July, and they continue to lay eggs up to the middle of September (1915) and probably even later.

This is the largest *Pseudococcus* of which the writer knows, and its size and host plant are enough for ready identification. This scale insect is invariably attended by certain common black ants and the Coccidæ are generally in groups of two or three, but sometimes as many as ten are grouped under a slab of bark only six inches in diameter. This gregariousness in habit probably occurs because the ants can collect an abundance of "honey-dew" from the colony without any great difficulty, thus saving time and energy on the part of the ants. As many as fifty ants have been observed encircling one female adult, and as many more were crowding around to get their meal of secreted fluid. When disturbed by the removal of the bark, the ants would run around frantically with the tips of their abdomens elevated and their mandibles extended, making a most formidable appearance. The Coccids are generally located between the bark and wood where

there is just enough room for them to expand to their maximum development, and where the ants have easy access to the food-supply of secreted liquid. The writer has, however, occasionally found an isolated female scale which had been protected from external agents by the ants building up walls of frassy material from the wood of the tree to the shaggy flake of bark which had weathered away from the Coccid, thus exposing it to the attacks of predacious or parasitic insects until such a protection had been built by the ants. Through this wall of protective material were several entries or exits, as the case might be, for the ants to go to their "cows."

Natural Enemies.—While collecting this scale insect, the writer has found several Syrphid spp. larvæ in close conjunction with the sides of the scales, apparently feeding on their bodies. Insects thus attacked were partially shrivelled, but still alive and attended by the ants as usual. In a few cases the Syrphid larvæ were completely covered by the adult scale, probably having wormed their ways beneath the insects. It would appear that the ants tolerate this intruder, but for what reason, the writer cannot definitely say, unless it is because the Syrphid larvæ also give off a sweetened secretion, or because the ants have not learned to distinguish between the scale and the fly larvæ, or because the intruder does not entirely destroy the secreting faculties of this coccid. Most of the Syrphid larvæ are apparently of one species, being salmon pink in colour, and about 3 mm. long and 1 mm. wide at time of observation (14 Aug., 1916). However, a large, flattish circular or slightly elongate creamy-white Syrphid larva, 4 mm. long and 3 mm. wide was also taken in connection with the scales, but none have matured to render identification possible. No parasitic Hymenoptera have been reared from this Coccid.

Remarks.—A smaller, differently coloured mealy-bug, possibly very close to this species is mentioned from the same host in Indiana, but is not fully described, nor is it named by the State Entomologist of Indiana in his 1910 report, p. 226.

THE NYMPHS OF THE NORTH AMERICAN SPECIES OF LEUCORRHINIA.

BY E. M. WALKER, TORONTO.

Through the kindness of Mr. F. C. Whitehouse, of Red Deer, Alta., who has been actively collecting and studying the Odonate fauna of this locality during the past two years, I have recently obtained nymph exuviæ of *Leucorrhinia borealis* Hagen and *L. proxima* Calvert, the only two North American species of this genus, whose nymphs have not yet been described. Recently-emerged imagines of both species, as well as of *L. hudsonica* were found by Mr. Whitehouse, accompanied by their exuviæ, so that in addition to the finding of the two new nymphs he has been able to furnish the information necessary to prove that the nymph described by me as that of *hudsonica** was correctly referred to this species.

The nymphs of *Leucorrhinia* may be characterized as follows:—Head somewhat less than twice as broad as long, eyes most prominent behind the middle, lateral margins very oblique, curving into the posterior margin without any indication of an angle. Mentum of labium about as broad as long, mental setæ usually 13-15, inner margins of lateral lobes with very low crenulations, the marginal spinules in groups of two or three, of which one is much the longest, sometimes single; movable hood slender, scarcely half as long as the free margin of the lateral lobe; lateral setæ 10 or 11. Abdomen ovate in outline, broader than the head, broadest at segment 6, tapering almost equally cephalad and caudad; lateral spines present only on segments 8 and 9, those on 9 not extending beyond apices of abdominal appendages; dorsal hooks present or absent, but never on segment 9; superior appendage triangular, acuminate, distinctly longer than broad, but little shorter than the inferior appendages; lateral appendages about half as long as the inferiors.

I have been able to find no good characters for the separation of nymphs of *Leucorrhinia* and *Sympetrum*. Generally speaking, the superior abdominal appendage is somewhat more elongate and acuminate in *Leucorrhinia*, being considerably longer than the basal breadth and not much shorter than the inferior appendages.

* Can. Ent., 1914, vol. XLVI, p. 375, pl. XXV, figs. 9-12.

In *Sympetrum* it is usually but little longer than broad, and falls considerably short of the inferior appendages even when the appendages are closed together. The head in *Sympetrum* is relatively somewhat larger, as a rule, than in *Leucorrhinia*.

Leucorrhinia hudsonica and *L. borealis* are distinguishable from all the known nymphs of *Sympetrum* except *S. rubicundulum*, *S. illotum* and *S. corruptum* by the absence of dorsal hooks on segs. 7 and 8. They are readily separated from these by the much larger lateral spines and the conspicuously striped venter of the abdomen. The other species of *Leucorrhinia* are distinguished from *Sympetrum* by the presence of a small dorsal hook on seg. 3, which, however, is very minute in *L. proxima*.

In offering the following key I am well aware that it may prove unsatisfactory in certain respects. The nymphs of *Leucorrhinia* and *Sympetrum* are variable in the very characters which are most useful in separating them. Those of *L. intacta*, *glacialis* and *proxima* are extremely similar and as I have had only a single exuvia of *glacialis* and but two of *proxima* it is quite uncertain whether or not the characters given will prove to be constant when more material is available for study.

Key to the Nymphs of the North American Species of Leucorrhinia.

A. Dorsal hooks present on abd. segs. 2–8, venter of abdomen without longitudinal dark bands.

B. Eyes very prominent; lateral spines of seg. 9 extending back nearly or quite as far as tips of inferior appendages..... *frigida* Hag.

BB. Eyes less prominent, lateral spines of seg. 9 not extending back as far as tips of inferior appendages.

C. Dorsal hook of seg. 7 as long as mid-dorsal length of the segment, that of seg. 8 projecting well over the base of seg. 9; lateral spines of seg. 8 more or less divergent, their outer margins not continuing the regular curve of the abdominal margin; lateral spines of seg. 9 extending beyond tips of lateral appendages.

D. Spinules on inner margin of lateral lobes of labium mostly in groups of 3; lateral setæ 10; dorsal hook

of seg. 8 not declined, directed straight caudad at apex.....*intacta* Hag.

DD. Spinules on inner margin of lateral lobes of labium mostly single; lateral setæ 11; dorsal of seg. 8 generally somewhat declined, the tip sometimes resting on dorsum of seg 9*.....*glacialis* Hag.

CC. Dorsal hook of seg. 7 shorter than the mid-dorsal length of the segment, that of seg. 8 projecting barely over the base of seg. 9, lateral spines of seg. 8 slightly convergent, their outer margins continuing the general curve of the abdominal margin; lateral spines of seg. 9 not reaching beyond tips of lateral appendages.....*proxima* Calvert.

AA. Abdominal segs. 7 and 8 without dorsal hooks, venter of abdomen with 3 conspicuous longitudinal dark bands (rarely inconspicuous).

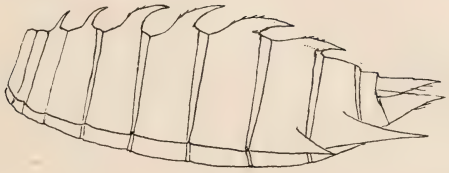
E. Length less than 18 mm.; lateral spines of seg. 8 two-fifths to one-half as long as the lateral margin of the segment (not including spine); dorsal hooks absent or vestigial ones present on some of the segments.....*hudsonica* Selys.

EE. Length more than 18 mm.; lateral spines of seg. 8 one-sixth to one-fourth as long as the lateral margin of the segment; dorsal hooks absent.....*borealis* Hag.

Leucorrhinia borealis Hagen.

Nymph.—Eyes less prominent than in the other North American species of *Leucorrhinia*, the width of the head across the eyes being somewhat less than twice the length (not including labium); postero-lateral surfaces broadly rounded with numerous coarse hairs. Mentum of labium of the usual size and form, being subtriangular, nearly as broad as long; the median lobe rather bluntly obtusangulate; lateral lobes with inner margins feebly and broadly crenated, the marginal spines short, single, or with a second vestigial spinule; posterior margin with a few short scattered spinules or almost devoid of these; mental setæ 13, occasionally 14, the third

*Vide Needham, Bull, 47, N. Y. State Mus., p. 519, 1901.



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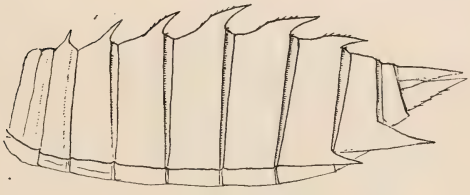

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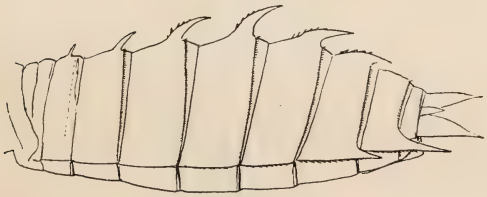

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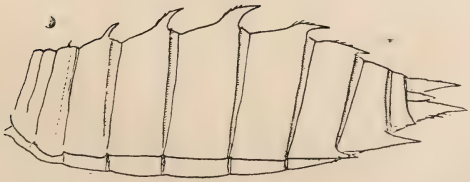

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NYMPHS OF LEUCORRHINIA.

to sixth from the outside longest; lateral setæ 11, sometimes 10. Abdomen somewhat elongate ovate, broadest at seg. 6, or at apical margin of seg. 5, tapering almost equally proximad and distad, its lateral margins forming an almost regular arc, fringed with spinules distally, especially on segments 8 and 9. Dorsal hooks wholly

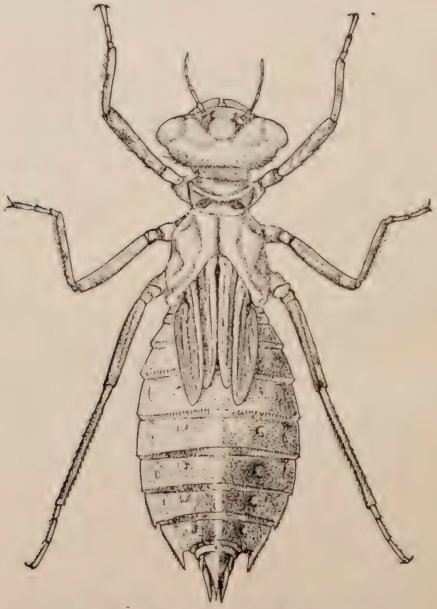
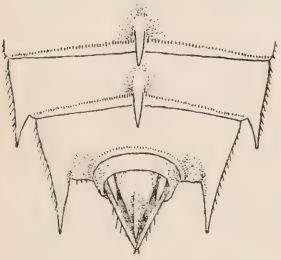


Fig. 20.—*Leucorrhinia borealis*, Hag., nymph.

absent. Lateral spines of seg. 8 about one-seventh to one-fourth as long as the lateral margins of the same segment (not including the spine) their inner margins nearly parallel; those of seg. 9 about two-fifths the length of the lateral margin of the segment, not reaching apices of lateral appendages, their inner margins slightly convergent. Superior appendage triangular, keeled and somewhat



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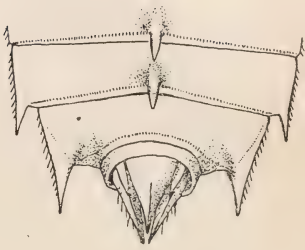

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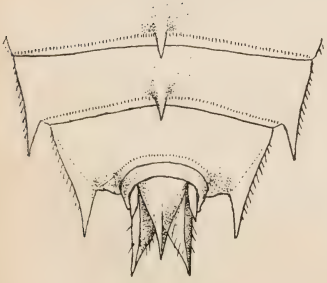

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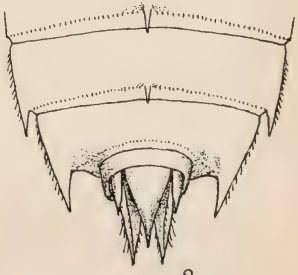

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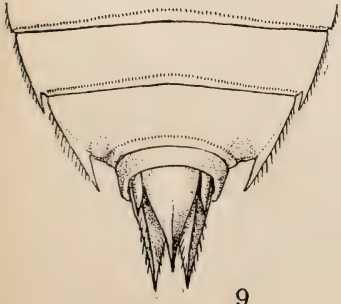

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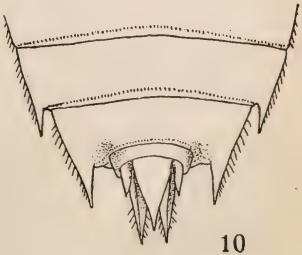

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NYMPHS OF LEUCORRHINIA

spinulose on distal half above, about twice as long as lateral appendages and reaching back nearly to tips of inferior appendage; basal breadth about three-quarters of the length.

Colour pattern (exuvia)—Dull brownish more or less distinctly marked with paler yellowish. Head dark, sometimes streaked with pale yellowish behind and beneath the eyes; thorax obscurely mottled; wing-pads with more or less distinct pale costal streaks; legs pale with darker annuli as follows: femora with subbasal, anteapical and apical, tibiæ with basal, median and apical annuli, tarsal joints darkened distally. These markings are often largely obscure, the anteapical femoral rings being the most distinct and constant. Abdomen dark above with a median line, a pair of dorso-lateral spots and the postero-lateral angles on most of the segments pale.

Venter pale with three longitudinal dark bands, which may be somewhat obscure but are generally heavy and conspicuous. They are usually narrower but sometimes broader than the intervening pale areas.

Length of body 19.0–21.5 mm.; outer wing-pad 6.0–6.5 mm.; hind femora 5.0–5.8 mm.; width of head 5.25–5.6 mm.; width of abdomen 6.7–7.3 mm.

This nymph closely resembles that of *L. hudsonica*, particularly in the absence of dorsal hooks and the conspicuously striped venter of the abdomen. It is, however, easily distinguished from *hudsonica* by its larger size and the shorter lateral spines on segments 8 and 9.

Leucorrhinia proxima Calvert.

Nymph.—Exuvia similar to that of *L. intacta*, slightly larger. Head a trifle longer and the eyes a shade more prominent. Width of head across the eyes about twice the length (not including labium) postero-lateral surfaces broadly rounded with numerous bristles. Labium of the usual form, the mentum quite similar to that of *intacta*, slightly longer than broad, middle lobe bluntly obtusangulate. Inner margins of lateral lobes with the usual broad, low crenulations, which are minutely, secondarily crenulate, the spines mostly in groups of two, of which one is much shorter than the other, a few single. Movable hook slender, nearly half as

long as inner margin of lobe. Mental setæ 11–15 (one specimen has 11 and 14, the other 13 and 15) of which the outer fourth to sixth is the longest. Lateral setæ 11 (10 on one side of one specimen). Abdomen ovate, broadest at seg. 6, tapering almost equally roxi mad and distad, the lateral margins almost regularly arcuate, fringed with spinules which become gradually stronger caudad. Lateral spines of seg. 8 about two-fifths as long as the margin of the segment, their outer edges continuing the regular curve of the abdominal margin, their general direction slightly convergent; those of seg. 9 about three-fifths as long as the margin of the segment, extending back to the apices of the lateral appendages, their outer margins straight and about in line with those of the segment, their general direction somewhat convergent. Superior appendage keeled above in the distal half, basal breadth about three-fourths the length, apex slender, slightly acuminate, sharp-pointed; lateral appendages about half as long as the superior; inferior appendages slightly surpassing the superior, with 4 or 5 spinules on their outer margins.

Colour pattern.—The two exuviæ show nothing distinctive in coloration. They are pale with darker mottlings as in *glacialis* and *intacta*. Femora with sub-basal and anteapical annuli and darkened at apices, tibiæ with basal and median annuli, also darkened at apices. Abdominal segments with a row of pale spots on each side, nearly midway between the middle line and the lateral margins. These spots are surrounded by darker cloudings and behind each is a dark spot. They are obsolescent in front of seg. 6. Laterad of these are irregular dark annuli with pale centres, and at the lateral margins of most of the segments the darker colour occupies the anterior half of the segment. Lateral spines pale, tipped with dark brown.

Length of body 19–20 mm.; outer wing-pad 6 mm.; hind femora 5.8–6.0 mm.; width of head 5 mm.; width of abdomen 7 mm.

Explanation of Plates xii and xiii.

Plate XII—Nymphs of Leucorrhinia, left lateral views of abdomen.

Fig. 1.—*L. frigida.*
Fig. 2.—*L. intacta.*
Fig. 3.—*L. glacialis.*
Fig. 4.—*L. proxima.*

Plate XIII—Nymphs of Leucorrhinia, terminal segments of abdomen, dorsal view.

Fig 5.—*L. frigida.*
Fig. 6.—*L. intacta.*
Fig. 7.—*L. glacialis.*
Fig. 8.—*L. proxima.*
Fig. 9.—*L. borealis.*
Fig. 10.—*L. hudsonica.*

NEW SPECIES OF NEW ENGLAND SARCOPHAGIDÆ.*

BY R. R. PARKER, BOZENMAN, MONT.

(Continued from page 364.)

Sarcophaga scoparia nearctica, n. subsp.

Type.—Massachusetts Agricultural College, male and female.

Paratypes.—Collection of author, two males, one female.

♂.—Posterior trochanter without "brush," with long hairs only; femur usually arched, posterior face without ventral row of bristles; tibia more or less curved, with an anterior and a posterior beard, latter much the stronger; middle coxa, at least dorsally, with more than a single row of bristles; tibia on about distal half with short, weak, anterior and posterior beards; ventral surface of anterior coxa clothed completely with bristles; anterior postsutural dorsocentrals weak but at least as long as those before the suture, only last two pairs strong; vestiture of third ventral plate erect and not short; both genital segments usually dull orange but first may be in part or wholly grayish pollinose; first segment in profile with a slight depression just anterior to marginal bristles, latter usually weak and often hair-like.

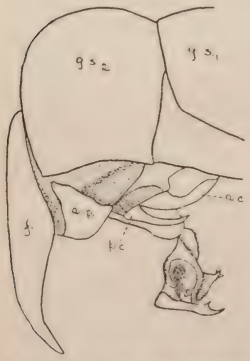

Fig. 21.—*Sarcophaga scoparia nearctica*, n. subsp., genital segments of male.

♀.—Vestiture of metanotum of short, reclinate bristles or of short nearly erect bristly hair except that vestiture of scutellum is hairy and erect throughout or at least anteriorly; anterior post-

* Contribution from the Entomological Laboratory of the Massachussets Agricultural College.

sutural dorsocentrals weak but at least as long as those before the suture, only last two pairs strong; nota of abdomen clothed with short, reclinate bristles above, beneath with more erect hairs or bristles; genital segments *protuberant*, somewhat cone-shaped, visible from above; the two broad lateral lips of the first genital segment dull orange, sometimes slightly darkened, spiracles close to anterior margins; fifth and sixth ventral plates fused; sixth fully exposed, not overlapped by lips of first segment, narrowed posteriorly, its posterior margin with bristles on each side of centre.

Length.—8.5 to 15 mm., average 12 to 14 mm.

♂.—Head.—Viewed from side, parafrontals and genæ with dark reflections. Breadth of front varies from slightly less to slightly greater than one-half eye width; cheek height approximately one-third or three-sevenths that of eye. Front prominent, sides of frontal vitta parallel or slightly convergent backward. Second antennal segment dark; third about twice length of second; arista plumose to beyond middle. Back of head somewhat convex, usually with four, sometimes three, irregular rows of black cilia behind eyes, otherwise clothed with whitish or yellowish hair that completely covers the metacephalon except that occasionally there are black hairs in lower anterior corners. Cheeks clothed with black hair. Gena with short row of long, sometimes bristly hairs near lower eye orbit, other shorter ones may continue upward. Palpi dark.

Chætotaxy.—Lateral verticals absent, rarely weakly developed; vibrissæ inserted slightly above mouth margin.

Thorax.—Metanotum clothed with slender, reclinate bristles or with bristle-like hair. Hairs covering anterior spiracle dark brown basally, lighter toward tips; those of anterior margin of posterior spiracle dark brown; those of spiracular cover dark brown or brownish, tips yellowish. Epaulets dark.

Wings.—Bend of fourth vein either an acute, right, or slightly obtuse angle; anterior cross-vein more basal than end of first longitudinal; third vein bristly; costal spine vestigial; section III of costa about one and one-half times section V or even longer; posterior margin of alulæ either bare or fringed with hair; calypters whitish, fringe of hairs dark at fold, otherwise whitish.

Legs.—Dark. Posterior trochanter without "brush;" femur

cylindrical or somewhat spindle shaped, often more or less arched, clothed beneath with long, fine hairs that become longer and coarser posteriorly, forming a sort of beard; anterior face with three rows of bristles, those of intermediate row shortest, and not developed distally; posterior face without ventral row of bristles; tibia more or less curved; anterior and posterior faces each with a beard of long, coarse, black hairs on about distal three-fourths, latter much the stronger: tarsus usually somewhat shorter than tibia, fourth segment at least one-half fifth. Middle coxa at least dorsally, with more than a single row of bristles, though the additional bristles may be rather slender: femur clothed beneath on posterior proximal half or more with long hairs; anterior ventral row of short, scattered bristles complete, posterior row represented only by "comb" extending proximally to the long hair: submesotibial bristle present, often obscured by coarse vestiture that covers tibia ventrally on distal half or thereabouts and becomes beard-like anteriorly and posteriorly. Ventral surface of anterior coxa clothed completely with bristles which are often separable into three irregular rows, one at each side and one intermediate that is usually less complete: vestiture of tibia longest ventrally, posteriorly and distally.

Chætotaxy.—Anterior dorsocentrals short and usually stout but longer than vestiture of præscutum; acrostichals absent or but slightly differentiated anteriorly; inner presuturals short and slender: last two pairs of postsutural dorsocentrals strong, anterior to these several weak pairs that vary greatly in length; prescutellar acrostichals present: scutellar apicals present: three sternopleurals lower sternopleura with a single row of bristles, otherwise clothed with long hairs which, in large specimens, become quite coarse.

Abdomen.—Somewhat conical or oval; clothed above with short, reclinate bristles, beneath with longer, more erect hair. Ventral plates, as a whole, with their sides converging posteriorly, their shape and size variable; vestiture decreasing in length posteriorly, that of third plate shortest and erect. Posterior margin at fourth notum, especially dorsally, may be dull orange.

Chætotaxy.—Second segment without marginal bristles; third with two and usually with slender, decumbent ones between these

and laterals; fourth with a complete row ending ventrally in long hairs.

Genital segments.—Prominent, usually the greater part of first exposed; ground colour dull orange or yellowish; first (g. s. 1) sometimes brownish, usually with pollen, sometimes partly grayish pollinose and occasionally entirely so except lateral posterior portions. First (g. s. 1), vestiture shorter than that of second, "humps" almost bare, in profile with a slight depression anterior to marginal bristles, latter rarely strong, usually hair-like or even so weak as to be scarcely distinguishable. Membrane joining first and second segments dorsally often blackish. Second (g. s. 2), rotund, not flattened, anal area rather small and not extending above middle of posterior surface. Forceps (♀) darkened, usually blackish, at least distally, hairy to beyond middle; base with upward flap-like extensions clothed with fine hair shorter than vestiture of second segment; tips of prongs spread and bent forward. (a. .p—ascessory plate, a. c.—anterior claspers, p. c.—posterior claspers.)

Genitalia.—Distinctive for North American species.

♀.—Females differ from males in the following important characters.

Head.—Breadth of front at narrowest part slightly less than eye width. Upper inner orbits of eyes diverging downward.

Thorax.—Vestiture of metanotum of short reclinate bristles or nearly erect bristly hair except that vestiture of scutellum is hairy and erect throughout, or at least anteriorly.

Legs.—Posterior trochanter with slender apical bristle: femur somewhat spindle-shaped, not arched, bristles of intermediate row on anterior face restricted to proximal half and sometimes only a few present; posterior row with ventral row of long, well separated bristles on proximal half or slightly more. Anterior and posterior ventral rows of middle femur complete, but bristles weak and inconspicuous distally: submesotibial bristle very strong, sometimes a short bristle just above it.

Chætotaxy.—Lower sternopleura with bristles only, or at most but a few long hairs anteriorly.

Abdomen.—Oval; vestiture short throughout, clothed above with reclinate bristles, beneath either with more erect hair or bristles.

Genital segments.—Protuberant, visible from above. The two broad lateral lips of first genital segment distinctly separate dorsally; dull orange, sometimes slightly darkened, occasionally yellowish pollinose ventrally; upper edges fringed with hair and bristles, latter mostly above lines of spiracles which are close to anterior margin. Spiracles of fifth segment usually concealed. Sixth ventral plate (seventh anatomical) with posterior marginal bristles at each side of centre and not overlapped by lips of first genital notum.

Described from 3 male and 2 female specimens, many others examined.

Range.—New England: Mass.: Woods Hole, Boston, Lowell, Cohasset, Gloucester, Cambridge, New Bedford, Wellesley, Melrose, Chester, Amherst; Me.: E. Eddington, Orr's Island, Buckfield; Conn.: New Haven.

United States.—N. Y., N. H., Pa., Ohio, Ill., Wy.

Böttcher (1912) has shown that *S. scoparia* Pandelle should more properly be called *Sarcophaga matertera* Rondani. *S. scoparia nearctica* is one of the most variable flies of this group with which we have to deal in New England; the description gives ample evidence. The characters of the penis are as much so as the external characters. In the figure of the genitalia a lateral distal process may be noted ending anteriorly in two sharp projections. Sometimes the lower projection is lacking while in other specimens the two processes are united anteriorly, forming a sort of distal ring.

Among my material are one female and two male specimens of the Palearctic species, *S. scoparia*. These differ considerably from the American subspecies. The genital segments and genitalia are black or blackish, the bristles of the thorax are longer and more slender, and its vestiture more hairy. Some of our specimens approach the European as regards chætotaxy and vestiture, but I have seen none with any tendency toward black genital segments, though the first is sometimes brownish. It is possible that our North American subspecies might justifiably be designated as a species.

The females of *S. scoparia nearctica* are rather difficult to distinguish from those of *S. utilis* Aldrich.

Specimens of this subspecies captured by Metz larviposited on dung and refuse. A female received from Richardson (N. J.) was captured on cow manure.

THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

Annual Meeting.

The fifty-third Annual Meeting of the Entomological Society of Ontario was held at the Ontario Agricultural College, Guelph, on Thursday and Friday, November 2nd and 3rd, 1916. The President of the Society, Mr. A. F. Winn, Westmount, P. Q., occupied the chair. The following were present at the meeting: Dr. L. O. Howard, Chief of the Bureau of Entomology, Washington, D. C.; Prof. P. J. Parrott, Geneva, N. Y.; Prof. E. M. Walker, University of Toronto; Prof. W. Lochhead, Macdonald College, P. Q.; Prof. W. H. Brittain, Truro, N. S.; Dr. C. Gordon Hewitt, Messrs. A. Gibson and J. M. Swaine, Entomological Branch, Ottawa; Messrs. W. H. Harrington and F. W. L. Sladen, Ottawa; Rev. Father Leopold, La Trappe, P. Q.; Mr. F. J. A. Morris, Peterborough; Mr. J. Dunlop, Woodstock; Prof. J. Dearness, London; Mr. W. A. Ross, Vineland Station; Mr. W. E. Biggar, Hamilton; Mr. N. Criddle, Treesbank, Man.; Mr. A. B. Baird, Fredericton, N. B.; Professors C. A. Zavitz, J. E. Howitt, C. J. S. Bethune, L. Caesar, J. W. Crow, D. H. Jones, E. J. Zavitz, and S. B. McCready, Dr. R. E. Stone, Capt. G. J. Spencer, Messrs. A. W. Baker, A. H. Tomlinson, G. H. Unwin, C. R. Klinck, H. R. Fry, G. F. Kingsmill, E. Hearle, A. W. Guild, R. M. Aiton, J. B. McCurry and W. Evans, Ontario Agricultural College.

Letters expressing regret at their inability to attend the meeting, and containing hearty good wishes for its success, were received from the Minister and Deputy Minister of Agriculture for Ontario, the Minister of Education, and a large number of the leading entomologists in the United States.

On Thursday morning a meeting of the Council was held, at which the report of the proceedings during the past year was

drawn up and various matters relating to the Society's welfare were discussed. A recommendation was made that Mr. John D. Evans, of Trenton, a past President of the Society and a most useful adherent for many years, should be elected a Life Member. This was subsequently done at the general meeting. It was decided that the next annual meeting be held at Macdonald College, Que. The President proposed that information regarding the principal collections of insects in Canada, both public and private, should be procured and published in the *Canadian Entomologist* from time to time.

In the afternoon the members met in the Entomological Lecture Room in the Biological Building, and the proceedings commenced with the presentation of the reports of the Council and the various officers and branches of the Society, followed by the reading of papers and the election of officers, a list of whom is given below.

The open meeting was held on Thursday evening in the auditorium of the Massey Hall, and the Society was particularly fortunate in having, as lecturer for the occasion, Dr. L. O. Howard, Chief of the Bureau of Entomology, U. S. Department of Agriculture. The subject of the lecture, "The Carriage of Diseases by Insects," is one with which Dr. Howard has been closely identified for many years, and was greatly enjoyed by the large audience, among which, besides the members of the Society, were many members of the staff and students of the College and of the Macdonald Institute. The lecture was copiously illustrated by many fine lantern slides.

The Society was welcomed to the College by Prof. Zavitz in the absence of President Creelman, and at the close of the lecture a hearty vote of thanks, proposed by Dr. Hewitt and seconded by Prof. Lochhead, was tendered to Dr. Howard for his interesting and instructive address, and for his kindness in coming so far to attend the meeting.

After the lecture the members were entertained at a smoker given in the students' parlour, Main Building, a students' vocal quartette contributing much to the enjoyment of those present. Mr. Eric Hearle, a graduate of the College, who recently returned from active service in France, gave an interesting account of the

problems arising from the prevalence of Pediculi and other insect vermin in the trenches, and the means taken to alleviate the terrible suffering caused by these pests.

The following papers were read at the morning and afternoon meetings:—

"The Naturalist in the City," by the Rev. Dr. T. W. Fyles; "Dusting Fruit-trees and Grapes for the Control of Biting Insects and Diseases," by Prof. L. Caesar; "General Notes on Aphids which occur on Apple-trees," by Mr. W. A. Ross; "Further Experiments with the Green Apple Bug," by Prof. W. H. Brittain; "Notes on Physonota unipuncta, the Sun-flower Tortoise-beetle," by Mr. A. F. Winn; "Preliminary Notes on the use of repellants for Horn-flies and Stable-flies on Cattle," by Mr. A. W. Baker; "The Wood of Desire," by Mr. F. J. A. Morris; "Insects as Material for Studies in Heredity," by Prof. W. Lochhead; "The Migratory Tendency in Dragonflies," by Prof. E. M. Walker; "The History of the Forest Tent-caterpillar and Fall Web-worm in North America," by Mr. A. B. Baird; "Three important Greenhouse Pests recently introduced into Canada," by Mr. A. Gibson; "Camp Hygiene," by Capt. G. J. Spencer; "Experiments in the Control of the Apple Maggot," by Prof. W. H. Brittain; "Summary of Experiments on the Control of Locusts by Coccobacillus acridiorum d'Herelle," by Messrs. E. M. Du Porte and J. Vanderleck; "Three Shade-tree Insects," by Mr. J. M. Swaine; "Notes on Some Insects of the Season," by L. Cæsar; and "Parasites of the Larch Saw-fly," by Dr. C. Gordon Hewitt. These papers will be published in full in the forthcoming Annual Report of the Society.

The election of officers for the ensuing year resulted as follows:

President.—Mr. Albert F. Winn, Westmount, Que.

Vice-President.—Prof. Lawson Cæsar, Dept. of Entomology, Ontario Agricultural College, Guelph.

Secretary-Treasurer.—Mr. A. W. Baker, B. S. A., Lecturer in Entomology, O. A. College, Guelph.

Curator.—Mr. W. Evans, O. A. College, Guelph.

Librarian.—Rev. Prof. C. J. S. Bethune, M. A., D. C. L., F. R. S. C., Professor of Entomology and Zoology, O. A. College, Guelph.

Directors.—Division No. 1, Mr. Arthur Gibson, Entomological Branch, Dept. of Agriculture, Ottawa; Division No. 2, Mr. C. E. Grant, Orillia; Division No. 3, Dr. A. Cosens, Parkdale Collegiate Institute, Toronto; Division No. 4, Mr. F. J. A. Morris, Peterborough; Division No. 5, Mr. J. W. Noble, Essex, Ont.; Division No. 6, Mr. W. A. Ross, Vineland Station, Ont.

Delegate to the Royal Society of Canada.—Mr. F. J. A. Morris, Peterborough, Ont.

By kind permission of the College authorities the members were provided with lunch each day in the new Dining Hall; this proved a great saving of time, and also an agreeable opportunity for social intercourse.

DR. L. O. HOWARD.

To Dr. L. O. Howard, Chief of the Bureau of Entomology at Washington, we offer our hearty congratulations on his election to membership in the National Academy of Sciences of the United States. This is regarded as the highest honour that can be bestowed on any scientific man in North America. As stated by Mr. E. A. Schwarz in a recent issue of the Proceedings of the Entomological Society of Washington, this honour has been well earned by Dr. Howard. "He has done a good deal of meritorious work in systematic and bionomic entomology; he has published many important works on economic entomology, but above all, he is now, and has for many years been the efficient chief and leader of the Bureau of Entomology, and as such has acquired a world-wide and deserved reputation. Under the enlightened and liberal administration of Dr. Howard, the growth of the Bureau of Entomology has been really marvellous. It has become a model for the many similar, though much smaller, institutions that have been established of late years in many countries."

"Since the organization of the Academy the following entomologists have been elected members: Dr. John L Leconte, Dr. A. S. Packard, Mr. Samuel H. Scudder, Prof. W. M. Wheeler in 1912, and now Dr. Howard." The three former are no longer living, and entomology is thus represented by the two latter only.

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